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Integration of Digital Certificate Blockchain and Overall Behavioural Analysis using QR and Smart Contract

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***Abstract*: The Main purpose of this study is to develop a theoretical framework for blockchain. Our aim is to identify the barriers and main drivers of digital innovation and explore the possibilities of applications of blockchain. A case study approach is applied: the Norwegian offshore industry. Primary data is collected through the interviews and secondary data is collected from reports of industries and companies, the Internet, and national and international media reports. We have discovered that intensions of cost reduction, and the amount of large data that maritime companies should process, along with the effective work intension, are the main drivers of digital innovation. On the other hand, the bad quality of internet, high cost implementation, the technology-oriented culture, the lack of investment initiatives, and risk aversion are the main barriers. Some of the barriers and motives of digital innovation and the introduction to blockchain technology were pointed out by earlier studies. However, we have identified many unique drivers and barriers specific to the industry. Finally, the framework of blockchain process developed.**

***Keywords*: Blockchain, digital innovation, OPM.**

1. Introduction

Advances in information technology, the wide availability of the internet, and common usage of mobile devices have changed the lifestyle of human beings. Virtual currency, digital coins originally designed for use online, has begun to be extensively adopted in real life. Because of the convenience of the internet, various virtual currencies are thriving, including the most popular-bitcoin, ether, and ripple [2]-the value of which has surged recently. people are beginning to pay attention to blockchain, the backbone technology of these revolutionary currencies. blockchain features a decentralized and incorruptible database that has high potential for a diverse range of uses. Blockchain is a distributed decentralized database that is widely used for recording distinct transactions. The transaction is added to a block which has records of other transaction, once a consensus is reached among different nodes. For connection each block contains the hash value of its last counterpart. All the blocks are connected and together they form a blockchain [1]. Data are distributed among various nodes (the distributed data storage) and are thus decentralized. consequently, the nodes maintain the database together. Under blockchain, only once a block is validated once it has been verified by multiple parties. A blockchain-based smart contract, for example, creates a reliable system because it dispels doubts about information's veracity.

2. Literature survey

Blockchain technology has evolved from being an immutable ledger of cryptocurrencies transactions to a programmable environment for building distributed reliable applications. Even though, blockchain technology is used to address various challenges, to our knowledge none of the previous work is focused on using blockchain to develop a secure and immutable scientific data provenance management framework that verifies the provenance records automatically. In this work, we use blockchain as a platform to facilitate trustworthy collection of data provenance, verification and management. The developed system uses smart contracts and open provenance model (OPM) to record the trails of immutable data. We show that our proposed framework can securely capture and validate provenance data, and can prevent any malicious modification to the data captured as long as majority of the participants are honest.

Technology has a positive impact on several aspects of our social life. Designing an architecture which is 24 hours globally connected enables ease of access to a variety of services and resources. Technology like the Internet has been a fertile ground for several innovation and creativity. One such disruptive innovation is blockchain – a keystone of cryptocurrencies. The blockchain technology is a game changer for many of the existing and emerging technologies/services. Because of its immutability property and decentralized architecture, it has been taking centre stage in many services as an equalization factor to the current parity between consumers and large corporations/ governments. One potential application of the blockchain is in e-voting schemes. The objective of such a scheme would be to provide a decentralised architecture to run and support a voting scheme that is open, fair, and independently verifiable. In this paper, we propose a potential new e-voting protocol that utilizes the blockchain as a

transparent ballot box. The protocol has been designed to adhere to fundamental e-voting properties as well as offer a degree of decentralisation and allow for the voter to change/update their vote (within the permissible voting period). This paper highlights the pros and cons of using blockchain for such a proposal from a practical point view in both development/deployment and usage contexts. Concluding that our paper is a roadmap for blockchain technology which will be able to support complex applications. The purpose of this study is to develop a theoretical framework for blockchain, Furthermore, our aim is to identify the main barriers and drivers of digital innovation and explore the possibilities of blockchain applications. A case study approach is applied: the Norwegian offshore industry. Primary data is collected through interviews, and the secondary data is collected from reports of industries and companies, the Internet, national and international media reports. We have discovered that the intensions of cost reduction, the high level of regulation in the maritime industry, and the amount of large data that maritime companies should process, along with the effective work intension are the main drivers of digital innovation. On the other hand, the high cost of implementation, the bad quality of Internet connections, the old age of decision-makers, the lack of investment initiatives, the low level of blockchain diffusion through the supply chain, and risk aversion are the main barriers. Some of the barriers and motives of digital innovation and the introduction to blockchain technology were pointed out by earlier studies. However, we have identified many unique drivers and barriers specific to the industry. Finally, the blockchain process framework is developed.ID.

3. Existing system

In the existing system, Lakhs of people getting Degrees year after year, due to the lack of effective anti-forge mechanism, events that cause the graduation certificate to be forged often get noticed.

4. Project objective

The objective of the project to introduce the new technology block chain on the certificate verification and make interview and verification as a digitalization. In order to solve the problem of counterfeiting certificates, the digital certificate system based on block chain technology. The illegal activities filled against a person and all the activities are updated in the Personal ID. Using the modification process, we would monitor not only the degree cortication alone but also entire personality and behavioral activities of that person. We deploy Unique based monitoring using this system.

5. Architecture diagram

Blockchain is a decentralized distributed database. The working processes of the system developed in this study are as follows:

- Schools grant a degree certificate and enter the student's data into the system. Next, the system automatically records the serial number of the student in a blockchain. The certificate system verifies all the data.
- Instead of sending conventional hard copies, schools grant e-certificates containing a quick response (QR) code to the graduates whose data have been successfully verified.
- Each graduate also receives an inquiry number and electronic file of their certificate.
- When applying for a job, a graduate simply sends the serial number or e-certificate with a QR code to the target companies.
- The companies send inquiries to the system and are informed if the serial numbers are validated.
- The QR code enables them to recognize if the certificate has been tampered with or forged.

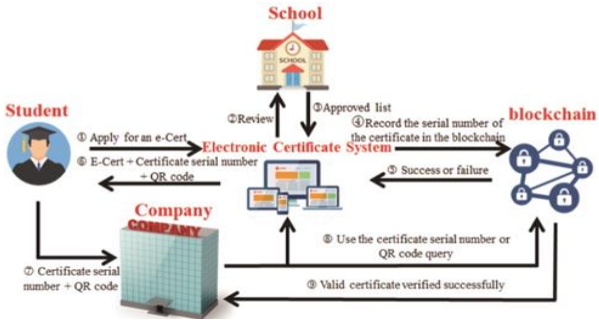

Fig. 1. Architecture diagram

6. Data flow diagram

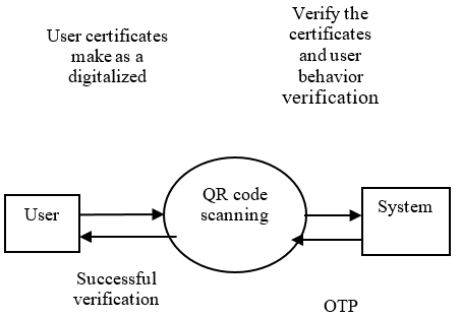

Fig. 2. Level-0

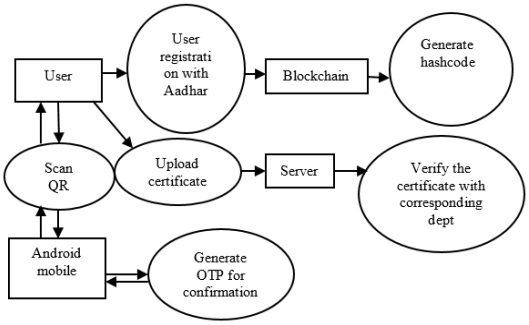

Fig. 3. Level-1

7. Feasibility analysis

During the system analysis the study of feasibility of the proposed system is to be carried out. This will ensure to the company that the proposed system is not a burden. For feasibility analysis, there must be some understanding of the major requirements for the system. Three key considerations which are involved in the feasibility analysis are:

- Economic Feasibility
- Technical Feasibility
- Operational Feasibility.

A. Economic feasibility

This study is carried out to check the economic impact on the organization. There is a limit of amount for fund that the company can pour into the research and development of the system. Thus the developed system will be within the budget and this was achieved because the technologies used are freely available. Only the customized products had to be purchased

B. Technical feasibility

This study is carried out in the system to check the technical feasibility, that is, the technical requirements of the system. Any system which is being developed must not have a high demand on the available technical resources. It will lead to high demands on the technical resources which are availabe. The developed system must have a modest requirement, so that only minimal changes are required for implementing this system.

C. Operational feasibility

The aspect of study is to check the level of user acceptance. It includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead the users must accept it as a necessity. The level of user's acceptance will fully depend on the methods that are being employed to educate the user about the system and to make him familiar with the system. His level of confidence should be raised so that he is also able to make some constructive criticism, as he is the final user of the system.

D. Modules description

A modular design reduces complexity of the system, facilities changes, which results in easier implementation by encouraging parallel development of different part of the system. It is easier to develop software with effective modularity because function may be compartmentalized and interfaces are simplified. Software architecture implies modularity that is the software is divided into separately named and addressable components called modules that are integrated to satisfy the requirements of the problem.

Modularity is the single attribute of software which allows a program to be intellectually manageable. There are five important criteria that enable us to evaluate a design method with respect to its ability to define an effective modular design are: Modular decomposability, Modular Comps ability, Modular Understandability, Modular continuity, Modular Protection.

The following are the modules of the project, which is planned to complete the project with respect to the proposed system, while overcoming existing system and provide support for the future enhancement.

- User interface design
- Server
- Verification
- Block creation
- Android based Qr code

E. User interface design

User interface design which we use to this project is NETBEANS and ANDROID STUDIO. For server communication we develop an IDE using Netbeans. Using android studio, we develop an android application to share and scan the QR code.

F. Server

Testrpc is a Node.js based Ethereum client which is used for testing and development. It uses ethereumjs which is used to simulate full client behavior and make the development of Ethereum applications much faster. It includes popular RPC functions and features and can be run deterministically to make development a breeze.

G. Verification

In this module user will upload the certificates like 10th mark list, plus two-mark list, college certificates, government certificates and so on. Before upload, those certificates will have verified by the corresponding sector, if we upload school certificate, the certificate number will check with corresponds school database server if that certificate is verified after that it will stored on server otherwise it will discard.

H. Block creation

A block is a container data structure. The size of a block 1MB (source). Here every certificates number will be created as a block. For every block a hash code will generate for security.

I. Android based QR code generation

In this module, based on certificate numbers QR code will generate. While creating QR code user can increase the count based on their needs. The major advantage of this module user can share the QR code to another person in case of necessity. When user scan the QR code an OTP will be send to the registered mobile for verification. After proper authentication user can view their certificates. If third person scan the QR code beyond the permitted limit, the third person's location will send to the authorized user with permission link. From that link user can allow or deny the person.

8. Conclusion

Thus the paper infer that through this we are implementing

the certificate verification while students going for interview and also we implement security for the certificates using block chain. One of the major features of blockchain technology is data security. Blockchain is a large and data centralized in which each node saves and verifies the same data. The certificate application process and automated certificate granting are transparent and open in the system. Companies or organizations can inquire for information from the system on any certificate. In conclusion, the system assures the information accuracy and security.

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