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Applications of Blockchain Technology and its benefits for Students in Education Sector

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ABSTRACT: - Blockchain is a new innovation in the world of Computer Science with world-wide reach. It is a system of recording data in decentralized way, such that, it becomes very difficult to make unauthorized changes to. With growing popularity, it has got many applications, such as in healthcare sector, real estate, financial industries, etc. This theory paper focuses on the Applications of Blockchain and explores its possible benefits for students in Education system. We cannot take for granted that the unlimited accessibility to the internet and its influence shall be helping students and improving the education system in the nearby future. But, it is argued that Blockchain shall. The slow rate of adoption of this technology reflects about the existing challenges faced by developers and users.

KEYWORDS: - Blockchain, Decentralized system, Applications, challenges

I. INTRODUCTION

1.1 What is Blockchain?

Blockchain is a decentralized data structure, which is a shared and immutable ledger that facilitates the process of recording transactions. It has opened up a new horizon of possibilities for trustless transactions and exchange of information. The strength of this technology is that it guarantees the fidelity and security of the record of data, and generates trust, without the need for a trusted third party. Data entered on blockchain are stored in blocks and are linked together via cryptography in chronological order.

1.2 Working with and without blockchain

Let's take example of leasing of a vehicle by a car-company. The companies make us believe that the process is quite easy, but in reality it's much more complex.

If the company is working without using Blockchain, each party within the company's network maintains its own ledger, which can take days or weeks to synchronize, as shown in Figure (a). On the other hand, if the company is using Blockchain technology and its shared ledger, every authorized participant can access and analyze the state of the vehicle, regardless of where it is in its life cycle, as shown in Figure (b).

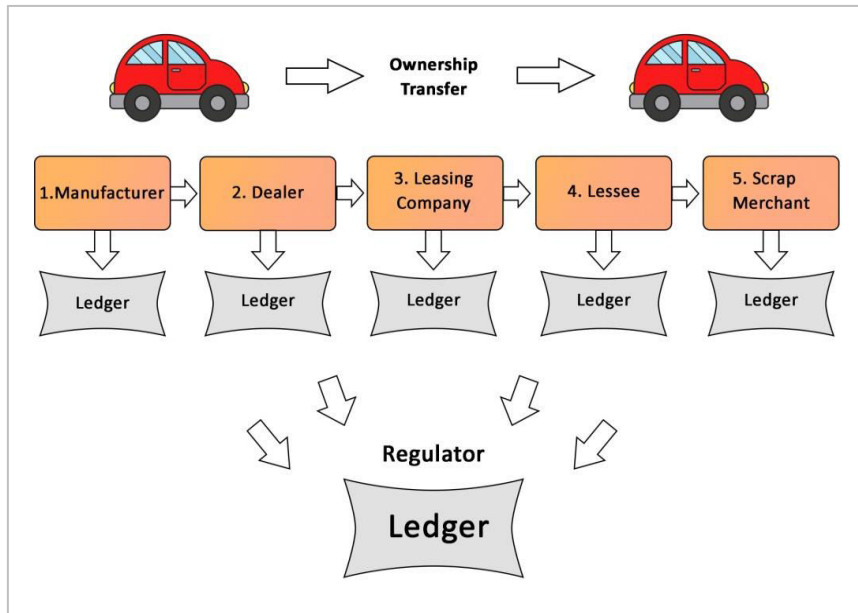


Figure (a) – Working without Blockchain

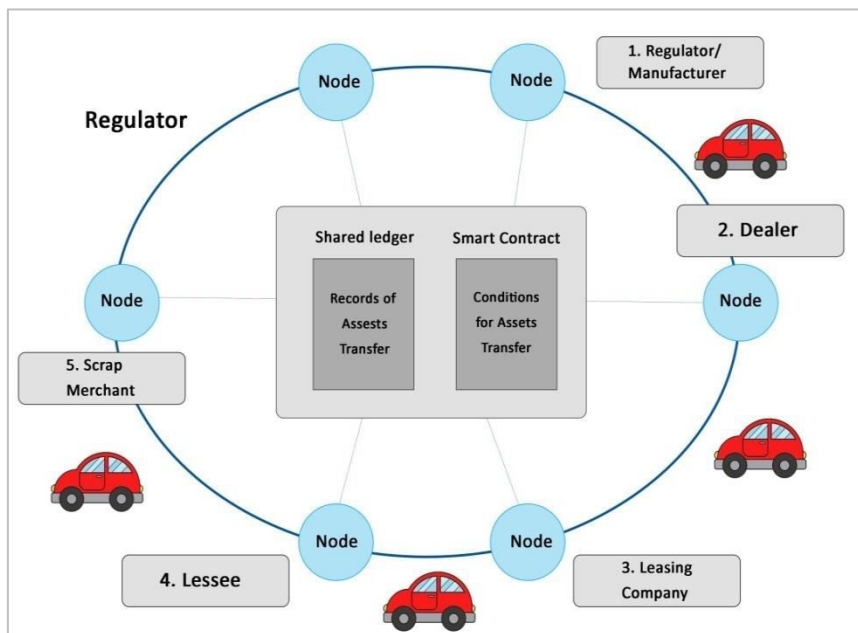


Figure (b) – Working with Blockchain

1.3 Applications of Blockchain in sectors other than Education

1.3.1 Supply Chain Management – Use of this new technology is providing an entirely new degree of transparency and trust in the Supply Chain Management System. It has enabled clients to increase the quality of the supply of the goods, speed the movement of the goods, and much more. For example in the field of *Food Industry*, it brings growers, processors, wholesalers, manufacturers, and all the other participating clients together to enhance the accountability in each step of the food supply.

1.3.2 Healthcare – Authenticity, confidentiality and security of data are things that can't be compromised in healthcare sectors. They need more efficient and secure systems for managing medical records, settling up insurance claims, performing complex transactions, etc. For example, the use of *Electronic Medical Records* in data centres, whose access is limited to hospital authorities only, is a good use of technology.

1.3.3 Government Services - Government sectors too have started using Blockchain to eliminate the inefficient centralized system. The technology has got its application in *Record Management, Identity Management, Voting*, etc.

Other Applications include: - Banking, Finance, International Payments, Insurance, Real Estate, Media, and many more.

II. METHODOLOGY

This research was performed by following some guidelines given below-

1.3 Identifying the purpose and the research questions for the review.

Knowing the question/purpose of the research/thesis paper helps making informed decisions about which resources to select and study. Based on the purpose of the study, following questions were raised:-

- a. What are the probable benefits of Blockchain technology to students if brought in to Educational field?

1.4 Describing the methods of data collection.

Data collection is the process of gathering information from a source, which readers need to know. Looking through the problem statement of the paper, the type of data selected is Qualitative data. Data has been collected from various resources such as from articles of relevant publishers, already published research papers, available interviews, and other online available knowledge. Some of them are:-

Articles

- a. *Blockchain in Schools and Colleges* – written by Nimish Rustagi and Anirban Chakraborti , published by The Indian Express on December 20, 2021.
- b. *How Blockchain is used in Education* – published by Maryville University

Other Research Papers

- a. *Blockchain in Education : opportunities, applications and challenges* – written by Mara-Florina Steiu, published by Peer-Reviewed journal on the internet.
- b. *Promises and Challenges of Blockchain in Education* – by Jae Park, published by Springer Open.

Existing Information

- a. *Blockchain explained* – by Investopedia
- b. *The growing list of applications and use cases of Blockchain Technology in Bussiness and Life* – by Insider Intelligence

Note that many more resources are taken into account for the study.

1.5 Describing the methods of data analysis.

There exist many methods to analyse data which is qualitative in nature. Some of the Data analysis methods for qualitative data are – Content analysis, Narrative analysis, Discourse analysis, interpretive phenomenological analysis, etc. Looking at the problem statement of the paper, and the data collected from various relevant resources, Content analysis is supposed to be the correct analysis method for the given statement. After data analysis, applications of Blockchain technology and its benefit in the education system became clearer.

1.6 Evaluation/justification of the research analysis.

Our methodology shows the approach we chose for our research work. This section discusses why other methods were not used and only the chosen method was used. Content analysis is the most commonly used method. It is a research tool which is used to determine the concepts, ideas, hidden meanings or phrases within some qualitative data. Since the articles, interviews, books etc., cannot be altered, content analysis is the best for this research work.

III. APPLICATIONS AND BENEFITS OF BLOCKCHAIN FOR STUDENTS

1.7 Full track of student's learning trajectory

Blockchain is a decentralized data structure which uses distributed database. The data are stored in blocks, chronologically with timestamps. The cryptographic algorithms make sure that the blocks once created can't be deleted, or the data once added to the blockchain network system can't be altered, which prevents all the data from fraud.

In today's era of high speed internet with its maximum availability, students prefer online courses for their skills up gradation. Also, students are applying for distance learning programs to get their degrees. What's happening with them is that they are storing their test results and certifications into their local drives or on online clouds, which only they have access to. This deprives their achievements and skills from public recognition.

Keeping all the information of courses, degrees, etc on the Blockchain is a very good way to keep track of all the skill sets held by an individual. Student's learning data include course resources and contents, test results, certifications, extra reviews, etc., which can be put on blockchain network with their respective timestamps. And, the blockchain algorithms which use cryptography to protect their data will make sure that the student's data are secure and immutable by any unauthorized means.

1.8 Availability of all the resources at one place.

There are many educational institutions, who are offering quality education through their online courses. Students, as mentioned earlier, prefer online educational courses for extra skills. For those who are in their higher education, cover same topic from various platforms. They have to log in to multiple different platforms to gather information. The process sometimes misses out the courses with quality content. Also, all the courses cannot be delivered at one platform due to restrictions on institutions such as copyright issues, platform issues, issues with payment of the fees, and so on. This leads to poor user experience with inefficient course utilization and also to the wastage of the good-quality contents.

Use of blockchain in such scenario proves to be very useful. If all the required courses are bought and put on blockchain network, students can access all of them at one place, without moving to various platforms.

Smart contract is considered as a typical application of blockchain technology. It is developed to complete complex transactions without human interventions. So, smart contract systems can take care of the complex transactions and verification needed to buy courses from various institutions and blockchain technology can put all of them together at one place. In this way the distributive storage of this technology will allow students to only log in to one node of the blockchain network, thereby increasing the learning efficiency and learning methods.

1.9 Efficient use of research works and intellectual studies

An important goal of higher studies is to share knowledge and pass them on to the next generations, which shall lead them in coming future. Another aim of higher studies is to gain more knowledge through conducting new researches. Professors and students work really hard and perform original researches to illuminate the areas which are left undiscovered or are less discussed, by publishing research papers or thesis papers.

University keeps record of all the published papers. But most of them are left undiscovered as readers remain unaware of their existence. This leads to the wastage of important discoveries led by researchers, professors and students. Also, the authors have an absolute interest in monitoring how their research is used.

Use of Blockchain network in Universities may enable publishers and authors to publish their papers on same platform. This will allow them to monitor their research, look how often the work is cited, observe its influence in the field, and so on. It shall also enable students and readers to go to a university platform and take advantage of the information they seek for.

Since blockchain technology is used, it can be assured that the papers shall remain secure because of the cryptographic algorithms used. This will make sure that all the research works done from the beginning till date, are kept safe on a network system and none of the precious studies are lost.

IV. CONCLUSION

Blockchain technology is a fast-developing technology. It has already changed the financial industry with crypto currencies. If introduced in educational sector, it shall show transformative effects on education as well. It will have to overcome challenges such as technical constraints, scalability, slow rate of adaptability, etc. before getting total comfort ability in the sector. The goal of the paper was to compile the major applications of blockchain which shall

prove to be useful in a student's life. New technology always brings some better features with them, so is this Blockchain technology in the field of education.

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