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A Blockchain-Based Smart Contract System for Digital Video Streaming Application

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ABSTRACT

Digital streaming also experiencing rapid expansion, the digital streaming application enables us to access and download videos using the existing electronic platform. All this time, services require the content provider to register the copyright to the marketplace or third party. With the existence of blockchain technology makes it possible for the customer to control their data, the available blockchain technology is Smart Contract. Smart Contracts enables instant payment without delay, without obstacles, and without a third party (mediator) which are performed in a decentralized network. Based on the reasons above, this paper will be focusing on a discussion about the smart contract blockchain on digital video streaming application by creating design a streaming video platform with a decentralized peer-to-peer concept.

Key words : Blockchain, Smart Contract, Digital Video Streaming.

1. INTRODUCTION

In Indonesia, digital streaming also experiencing rapid expansion, this phenomenon is not without reason but proven by the digital industry that currently participates in creating VOD services and the yearly growth has been recorded more than cinema viewers. Indonesia has main actors of the digital video streaming industry such as Netflix, VIU, Iflix. HOOQ.

Based on nakano.com data, Netflix's customers (figure 1) have grown rapidly from 2017 with total customers who are streaming with 95 thousand. In 2018 Netflix's customers in Indonesia increase by 2,5 times to 237,3 thousand customers. In 2020 the customers are predicted will be increased to 907 thousand customers or increased rapidly to 88,35% compared to 2019.
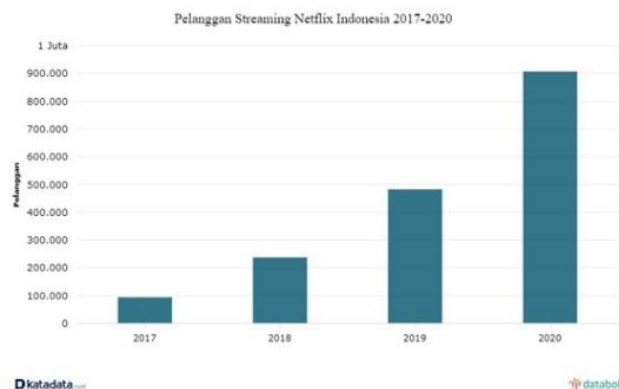

Figure 1: Netflix's customer data in Indonesia [1]

Netflix is not the only one that recorded such fantastic growth, another digital video streaming also achieved many customer's interests such as Viu, HOOQ, and Iflix. Viu managed to records rapid growth by having active customers up to 41,1 million every month or monthly active users (MAU) by the end of 2019, which is a 35% growth from 2018[2]. HOOQ is competing by achieving 40 million subscribers by 2019.

Streaming can be defined as a series of activities on observing a set of moving images and listening to voices that can be accessed via the internet. Based on that definition, then we can conclude that by digital streaming application we can access and download videos using the existing electronic platform. This digital video streaming application using Video on Demand service (VOD) concept that is referring to a technique that gives a possibility for customers to watch anything they want. VOD is one of the services that enable people to freely use their time. Technologically, the VOD system provides content through the network [3].

All this time the existing service process is anyone can be the broadcaster, run the streaming server, save data, or just sharing through network and customer pay what they are interested in. This kind of service can be untrusted and secure. And all this time services require content providers to register the copyright to the marketplace or a third party, and after that do the payment on ownership so the content can be aired

online in a digital streaming platform that effects content providers to pay as a big percentage to the third party. Then, viewers also need to do transactions to the third party to access the contents.

By the existence of blockchain technology enables the customer to control their data. Not only that blockchain technology also enables them to share their data for machine learning in a trust-less way. This service enables your data to be processed without a third party as a mediator. One of the blockchain technologies that can be used is Smart Contract. Smart Contract is a self-executing contract written in rows of codes where existing agreement in the contract can be performed automatically. Smart Contracts enables instant payment without delay, without obstacles, and without a third party (mediator) which are performed in a decentralized network. The concept we are discussing is where we can minimize a fraud if the content owner can directly receive the payment of the viewers' sum who enjoyed their content without having to pay a big percentage of the sale to the third party. By eliminating third party role makes the content owners can transparently see how and who enjoys their contents. Blockchain can automatically take care of license issues and digitally contracts.

Based on those reasons above, this paper will be focusing on the discussion of smart contract blockchain on digital video streaming application design by creating a streaming video platform with a decentralized peer-to-peer concept that can accelerate high definition content delivery with low cost in the entire geographical area. They enable the content owners to bypass the server, streaming solution is developed by displaying crypto-based payment and using a platform such as Etherum, Hyperledger, and Smart Contract to distributes peer-to-peer content. Our blockchain development plan is to combine incentive mechanisms that push the viewers to contributes to computing source and their bandwidth in return for a reward.

2. LITERATURE REVIEW

A. Blockchain

Blockchain is a concept where the data is not stored in a big storage system but distributed through device or system that use blockchain-based system [4]. Blockchain defined as a series of time signed blocks and connected using cryptographic hashes. Block can contain transactions, the number of users, and generally available for every network's users. Moreover, every block containing a hash from the previous block and data transaction, until creating a set of secured blockchain and can't be changed, only added. This chain will keep increasing because every new block will be added at last [5]. Blockchain is divided into 4 generations that are 1.0, 2.0, 3.0., dan X.0.10. Blockchain implementation in

any telecommunication branch will be useful. Blockchain makes the steps to achieve a trust-less environment that shows how paperless transactions with Blockchain technology usage can ensure better security [6]

B. Smart Contract

Smart contract is an agreement in the form of electronic that is closely related to blockchain technology. Blockchain appears for the first time by an idea from a bunch of people that identified themselves as Satoshi Nakamoto, this idea arises because of customer's trust issue on banking system through electronic money called Bitcoin [7]. Smart contracts originated from a blockchain known as Ethereum, with the platform virtualization, can develop self-driven contracts with decentralized, semi-decentralized, or centralized control. Smart Contract can help various parties make contracts to reduce costs, increase efficiency and consistency. [8]

The recent technology development in Indonesia is Blockchain. In the Blockchain network, there is a Smart Contract. Smart Contract has many benefits such as can pass through the third party and create airtight agreements. One of the many industries that be able to use Smart Contract is the financial industry. Smart Contract capable of giving high-transparency and high-security. Research about Blockchain technology stated that Blockchain technology in a streaming content company is useful because the company will require safe and secure data storage and interoperability supply[9].

C. Blockchain For Digital Video Streaming

Blockchain-based video streaming intends to build peer-to-peer networks that decentralized with multipurpose monetization mechanisms for video streaming services. They scale back operation value, have bigger fault tolerance, fewer trust necessities between storage suppliers and data owners, and are less prone to attacks. The previous research suggested a new blockchain-based framework for video streaming system with video content is sent to the media server through the RTMP protocol. Then using a different protocol such as IPFS, Codec, HLS, transcoded video, encrypted, decrypted, and sent to end-user. By this way, our suggested system has a potency to solve the problem such as piracy with the help of basic blockchain technology [10].

A blockchain-based streaming video system intends to build a peer-to-peer network that decentralized with a flexible monetization mechanism for streaming video service. In other research, there is a new suggested blockchain-based framework with an adaptive block size for video streaming with mobile edge computing (MEC). First, the incentive mechanism is designed to facilitate collaboration among

content makers, video transcoder, and customer. After that, providing block size adaptation schema for blockchain-based video streaming. Moreover, using two condensation modes such as flading or device-to-device (D2D). Then, formulated the source over-allocation problem, load scheduling, and adaptive block size as an optimization problem. This research is using (ADMM) to solve the problem in a distributed manner. The simulation result will be provided to shows the suggested schema effectivity [11].

D. Ethereum

Ethereum is a peer-to-peer network of a virtual machine that can be used by every developer to run an application distribution (Dapps). This program can be anything, but this network is optimized to mechanically run when a certain condition is fulfilled such as a contract.

Ethereum uses its own decentralized public blockchain to cryptographically store execute and protect these contracts. Every computer in their network downloads small virtual machines to be synchronized with Ethereum blockchain and always available to execute the contract. This distribution by computer network concept is easily giving security, reliability, and cloud power required to do the designed settings. Blockchain Ethereum can be publicly found. The definition of Ethereum is to make an alternative protocol to build a decentralization application.

Ethereum performs this by creating what is basically a main abstract base layer: a blockchain with a Turing-complete built-in programming language enables anyone to write Smart Contract and decentralized application that enables to create an arbitrary regulation for own ownership, transaction format, and state transition function. Smart Contract, cryptographic that has value and only opened if a certain condition is fulfilled, can be created on a platform, with strength bigger than what Bitcoin scripting offered. It is because the strength added are Turing-completeness, value-awareness, blockchain awareness and state [12].
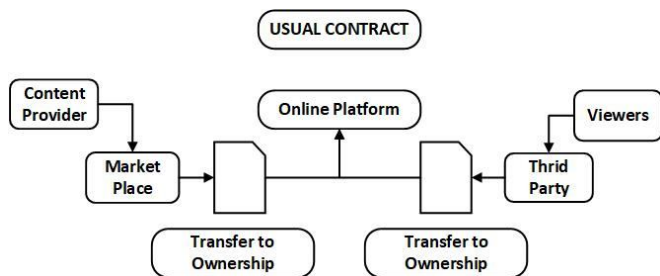
3. RESEARCH METHODOLOGY

Figure 2: Usual Contract from Digital Video Streaming Application.

The current condition in using Digital Video Streaming (figure 2) is not yet using Smart Contract. Where Content Provider still registering the copyright to the market place (Ikast.io) who usually called the third party, after that do the payment to ownership so the content can be aired to Online Platform (Netflix, Iflix, and etc). Therefore, can be concluded if not using Smart Contract them Content Provider should pay more to Market Place company or third party. So it does with the viewers who want to watch the contents that have been published by Online Platform (Netflix, Iflix, and etc). They also have to go through similar steps by contacting the third party before finally can enjoy the contents. Furthermore, there is still a possibility to pay more to a third party.
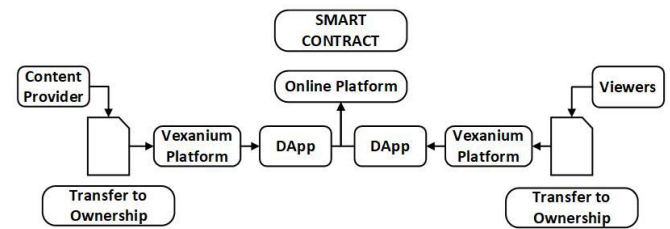

Figure 3: Smart Contract from Digital Video Streaming Application.

In reference to the previous condition, then finally we as the authors are designing the process using Smart Contract by using DApps (figure 3). As we have known that DApps is an application that can be run by users without any third party to control. By the existence of DApps, also helps to not giving private data to parties who can misuse the data. Not only that reason alone DApps will also be more resistant to attack than an application that only depends on one server.

One of the public blockchains that are spreading around Indonesia is Vexanium. Vexanium has some benefits that can be got such as using the C++ programming language, using Delegated Proof of Stakes (DPoS) consensus, Theft and Freezing Prevention Feature, Scalability, and, cheaper RAM cost.

In regards to the condition that we want to implement, to reduce more payment to Market Place company or third party or fraud, then the "transfer to ownership" process is moved to the first process or phase. After that using the Vexanium Platform with DApps until logged in to Online Platform. Similarly as viewers part, the process also similar to get some required contents. Therefore, can be concluded by the existence of DApps it is expected to create everything more transparent, secure, and fair for all parties.

4. CONCLUSION

Digital streaming is also experiencing rapid expansion in Indonesia. A range of main actors in digital video streaming

in Indonesia such as Netflix, VIU, Iflix, and HOOQ. The digital streaming application can be used to access and download a video using the existing electronic platform. This digital video streaming application is using Video on Demand (VOD) concept which refers to a technique that gives the possibility for users to watch what they want. The blockchain effect on the video streaming industry is also very significant. As have been explained before that if a digital video streaming application process is not using Smart Contract, then there will be a possibility for users to pay more to third party company. Therefore, we suggest using the Smart Contract process with DApps. DApps itself will never give private data to parties that will misuse it. This application also will be more resistant to attack than other application that depends on one server. In the implementation, blockchain also using the C++ programming language, using Delegated Proof of Stakes (DPoS) consensus, Theft and Freezing Prevention Feature, Scalability, and, cheaper RAM cost. Therefore, DApps is expected to make everything more transparent, secure, and fair for all parties.

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