Performance Evaluation of Ethereum, EOS & Steem based DApp's

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Abstract - Blockchain DApps are rapidly growing applications. DApp stands for Decentralized applications. Analysis of these DApps is performed. The collected data is based on DApps from a website namely "State of the DApp", This paper selected a case study of top ranked DApps among the listed ones based on different protocols used such as Ethereum, EOS, Steem. These findings can help the DApp developers to consider Quality parameters.

Keywords - DApp, Ethereum, Steem, Protocols,

I. INTRODUCTION

Let's understand what is DApp? And the other terminology used in development of DApp.

DApps Stands for **Decentralized applications.** Where the Backend is Blockchain technology and frontend can be GUI created in any language.

DApp = frontend code + Blockchain Technology

Blockchain Technology: BlockChain Technology recognised as 3D Technology.

- Distributed database
- Decentralized environment
- Digital Ledger

Features like decentralization, transparency, persistency, anonymity, auditability, openness and its security has attracted many developers and researchers.

Smart Contracts: It is a computer protocol intended to verify digitally using a **contract**. **Smart contracts** allow the transactions between peer to peer nodes without third party involvement. These transactions are trackable and irreversible.

A. Ethereum: Ethereum is an open source, decentralized blockchain platform that enables smart contract functionality and DApps to be built and run without fraud or interference of third party. Ethereum has its native programming language helping developers to build their Applications. Ethereum main net was launched on July 30, 2015.

B. EOS: EOS Blockchain protocol is aiming to become a decentralized operating system which can support decentralized applications. EOS is trying to compete with Ethereum. EOS main network was launched on June 9, 2018

C. STEEM: An incentivized, blockchain-based, public content platform. Steem blockchain uses steem as fundamental unit of account. Steem is a blockchain that supports community building and social interaction with crypto rewards. Steem's main net was launched on March 24, 2016.

II. BACKGROUND

[1] Stateofthedapp.com: The Ranking of the DApps is based on multiple factors like active users with unique source addresses in transactions to DApp contracts, transaction volume, activities of developers and based on user recommendations etc. once in 24h Rank is changed.

[2] Decentralized application (referred as dapp in short form) refers to an application that is executed by many users with a decentralized network. In recent years, the number of dapp keeps fast growing, mainly due to the popularity of blockchain technology. But still adoption is still a question in mind of developers along with this the insightful knowledge of existing Application to convert as Dapp is still missing so descriptive analysis is done to consider during development

[3] Proposed System which works without any third party involvement for electronic transactions. He used concept of digital signatures. This provided control of ownership, but had problem with double spending. Solution for this problem was given by proposing peer-to-peer network using Proof-of-work that becomes computationally impractical as honest nodes control majority of CPU. Nodes can leave and rejoin the network, accepting the proof-of-work to know when they were not the part of the chain. Validity of the blocks was based on the voting with their CPU power. Consensus Mechanism would help in decision making.

[4] The author says Ethereum implements the concept in a generalized manner. It also gives a way to plurality of such resources, and provides interaction through a message passing framework each with a distinct state and operating code. The paper also discusses the design, its implementation issues, the opportunities it provides and the future Problems.

[5] EOS is making its significance in a specific market sector—It performance like high throughput, no fee, user-facing dApps has attracted many developers. EOS is unique from rest of the platforms. These include its acute focus on scalability, on-chain governance, options for upgrades, and human- friendly usernames, account settings. Eos is also trying to compete with Ethereum.

[6] Content creators and Internet readers are benefited using Steem as it provides earning opportunities in ways that was not existing within the social media industry. Individual earn real online rewards for their contribution within Steem.

Those rewards may have dollar value due to the market price discovery and liquidity of Steem, and the people who hold Steem may have more exclusive earning powers.

III. METHODOLOGY

State of the DApp was considered for the selection of case study. Among 2,551 DApps were ranked by the website was considered.

Total Applications	**2,551**

Figure 1: Selection of top DApps

DApps were chosen based on unique platform /protocol used by the applications and the top ranked applications were selected for Case study. Platforms such as STEEM, ETHEREUM & EOS were considered

1. Steem: Among total of 64 Steem DApps Steemit was seleceted as it ranked 1 among all 2551 DApps. https://steemit.com/?utm_source=StateOfTheDApps
2. Ethereum: Among total of 2339 Ethereum DApps MakerDAO was selected as it ranked 3 among all 2551 DApps. https://cdp.makerdao.com/?utm_source=StateOfTheDApps
3. EOS: Among total of 223EOS DApps EOSKnights was selected as it ranked 10 among all 2551 DApps. https://eosknights.io/?utm_source=StateOfTheDApp

Table 1: Blockchain Protocols & DApps

Blockchain Protocol	**Total Dapps**
Steem	64
Ethereum	2339
EOS	223

Based on the selections three DApps were short listed among total of 2551 DApps. Performance such as adaptability, throughput was analysed considering their user, transactions and volume.

IV. ANALYSIS

A. Steemit - is a DApp that is ranked 1 in the stateoftheDApp.com. It is the new social media model. Steemit makes immediate revenue by growing and rewarding them for sharing contentThe Shareholders are benefited from user generated content. Steemit is changing the trend by flipping the standard model and providing the value to the most contribute user. Users can earn rewards in the form of cryptocurrency for every contribution they make and have control over their data and stand as platform stakeholders

Figure 2: DApp Steemit

So Steemit is giving opportunity to share your content by being a member one can be content creator and shareholder.

Table 2: Steemit Details

Name	Steemit
Category	Social
Protocol	Steem
Status	beta
Submitted	Dec 16th, 2018
Updated	Jan 3rd, 2019

B. MakerDAO - The MakerDAO Collateralized Debt Position (CDP) is a smart contract which runs on the Ethereum blockchain. The main technique of CDP is to create Dai in exchange for collateral and the concept is holding escrow until the borrowed Dai is returned. The main component is Dai Stable coin.

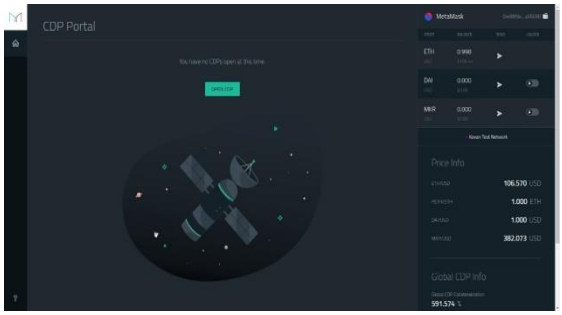

Figure 3: MakerDAO

The CDPs manage the total supply of outstanding Dai and also guarantee the value of circulating Dai. Creation and Destroying of Dai are done. When assets are leveraged the Dai is created and destroyed when it is repaid to the position. This mechanism allow the contract to account for the total supply of the stable coin thus proving that the portfolio of backing collateral can always guarantee the value of circulating Dai. 1 DAI is worth approximately 1 USD in underlying assets. The amount of the Dept is always less than the amount of collateral in a CDP.

Table 3: MakerDAO Details

Name	MakerDAO
Category	Finance
Protocol	Ethereum
Status	Live
Submitted	Apr 7th, 2016
Updated	Feb 5th, 2019

C. EOSKNIGHTS -The first Dapp mobile game on the EOS blockchain platform. This game is all about to show your skill to test with EOS knights. The skill is to protect the villagers before the Goblin horde massing attacks and wipes out the villagers.

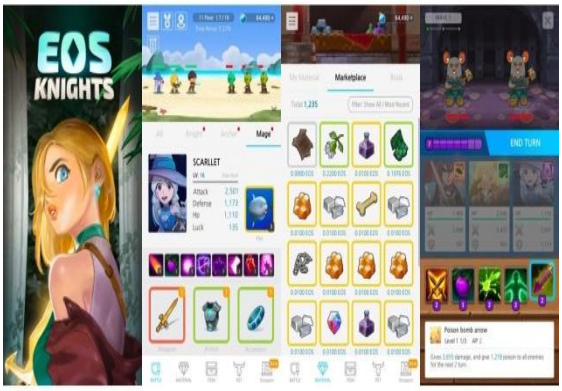

Figure 4: EOSKNIGHTS

The required materials can be collected and craft the items accordingly for your knight. The Archer has to defeat the Goblin army to save village. The data is stored and secured in the EOS blockchain . player actions are performed on the smart contract. EOS Knights is available for Android, iOS and on the web.

Table 4: EOS Details

Name	EOSKNIGHTS
Category	Games
Protocol	EOS
Status	Live
Submitted	Sep 19th, 2018
Updated	Jan 17th, 2019

V. PERFORMANCE PARAMETERS

1. **Throughput:** The throughput of blockchain network is calculated as number of transaction per unit time usually in seconds (Transactions per second). The Bitcoin throughput is 7tps.
   When the frequency of transactions in Blockchain network increases the throughput of the Blockchain network needs to be improved for its better performance.
2. **Latency:** Amount of time taken to complete one transaction. Currently bitcoin network roughly takes 10 minutes to complete one transaction.
3. **Adoptability:** Day to day many cryptocurrencies are raised and there are so many DApp created on crypto using different Blockchain protocols and platform so users are into concern Adoption of new DApp also can help in assessment.

Table 5: Protocol Performance

Platform	Latency	Throughput	TPS
STEEM	3s	2,522,380 / day	29.19421
ETHEREUM	12.5s	1,372,918/day	15.89025
EOS	1.5s	10,111,725/day	117.0339

VI. CONCLUSION

Though EOS is the right protocol as it has many users and the throughput of the Dapp is 3.0 tps it takes 0.33 seconds for one transaction. but in a new research benchmarking firm white block concluded that EOS is lacking the fundamental concept of Blockchain like immutability and also EOS token is essentially a cloud service computation – and is built on an entirely centralized premise. So still lot of research has to happen to confirm else EOS is trying to be Competitor of Ethereum. So we conclude that Ethereum is better to be adopted by the Dapp Developers as steem is designed especially for digital content business.

Table 6

Name	Category	Platform	Latency	Throughput	Users/day
Steemit	Social	STEEM	5.0 s	16,993/day = 0.1 tps	816
MakerDAO	Finance	ETHEREUM	41 s	2,068/day= 0.02tps	845
EOSKNIGHTS	Games	EOS	0.33 s	2,61,378/day==3.0 tps	6,975

Figure 5

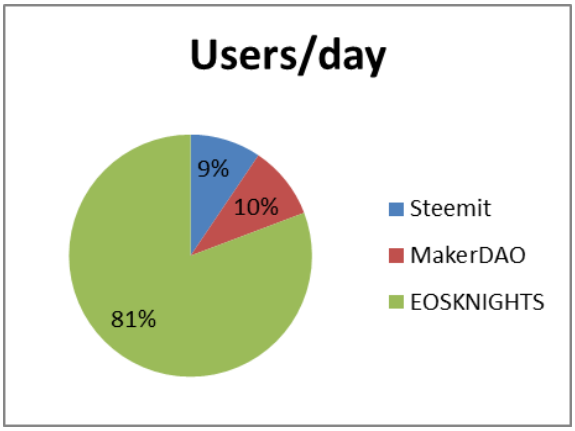

Figure 6

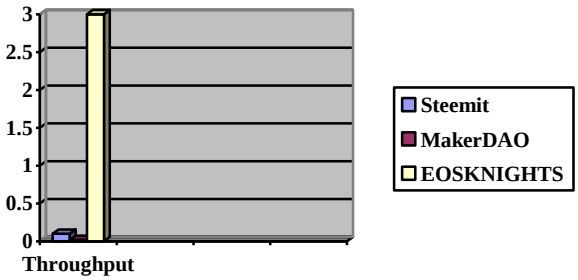

Figure 7

VII. REFERENCES

[1]. Duo, "DApp Statistics," [Online]. Available: https://www.stateofthedapps.com/stats. [Accessed FEB 2019].
[2]. K. Wu, "An Empirical Study of Blockchain-based Decentralized Applications," *arXiv:1902.04969,2019,* 2019.
[3]. S. Nakamoto, "Bitcoin: A peer-to-peer Electronic cash system," *Article,* 2008.
[4]. G. Wood, "Ethereum: a secure decentralized generalized distributed ledger," *arXiv:1011.1669v3,* 2018.
[5]. M. Snider, "EOS : Analysis and Valuation," pp. 1-29, 2018.
[6]. "Steem," *White paper,* 2017.
[7]. "ethereum," [Online]. Available: https://www.ethereum.org/. [Accessed FEB 2019].
[8]. "steem," [Online]. Available: https://steem.com/. [Accessed FEB 2019].
[9]. "EOS," [Online]. Available: https://eos.io/. [Accessed FEB 2019].
[10]. "EOS.IO," [Online]. Available: https://en.wikipedia.org/wiki/EOS.IO. [Accessed FEB 2019].
[11]. G. PHILLIPS, "Which Cryptocurrency Networks Process Transactions Fastest?," 6 DECEMBER 2018. [Online]. Available: https://blocksdecoded.com/fastest-cryptocurrency-networks/. [Accessed FEB 2019].
[12]. A. Girimath, "Ethereum [ETH], EOS, Tron [TRX] and Steem's Dapp performance over the year 2018," 17 JAN 2019. [Online]. Available: https://ambcrypto.com/ethereum-eth-eos-tron-trx-and-steems-dapp-performance-over-the-year-2018/. [Accessed FEB 2019].
[13]. "What is EOS Blockchain: Beginners Guide," [Online]. Available: https://blockgeeks.com/guides/eos-blockchain/. [Accessed FEB 2019].
[14]. J. Buntinx, "Top 6 Cryptocurrencies With the Highest Transaction Throughputs," 24 SEP 2018. [Online]. Available: https://nulltx.com/top-6-cryptocurrencies-highest-transaction-throughput/. [Accessed FEB 2019].
[15]. "Smart contract," [Online]. Available: https://en.wikipedia.org/wiki/Smart_contract. [Accessed FEB 2019].