

Blockchain: Scalability challenge



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Introduction

Many online transactions between individuals or organizations are based on a centralized controlled system (or controlled by a third-party organization). For example, a bank or a credit card vendor is acting as a third-party entity in executing a digital payment or money transfer process between two organizations (or individuals). The third-party vendor takes a fee for every successful transaction. In this centralized mechanism, the third-party controls and manages almost all the information of the stakeholders that are involved in the online transaction. This approach requires the third party to uphold the transaction's security. In contrast, blockchain is an immutable distributed ledger of cryptographically signed transactions maintained by a peer-to-peer network, where no third party is required to manage the information, and trust is no longer an issue among the network participants. Blockchain technology is one of the most hyped decentralized innovations, with an enlightening future

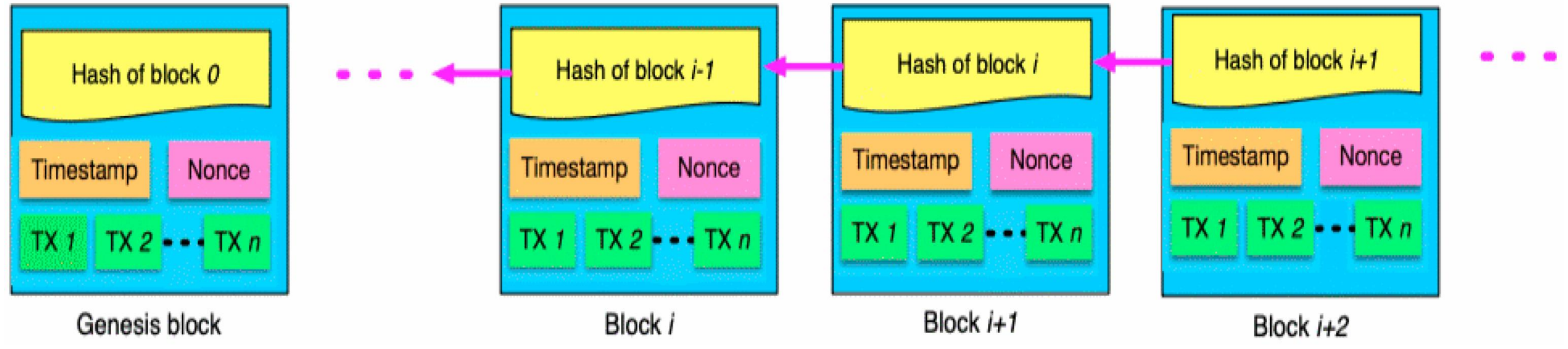
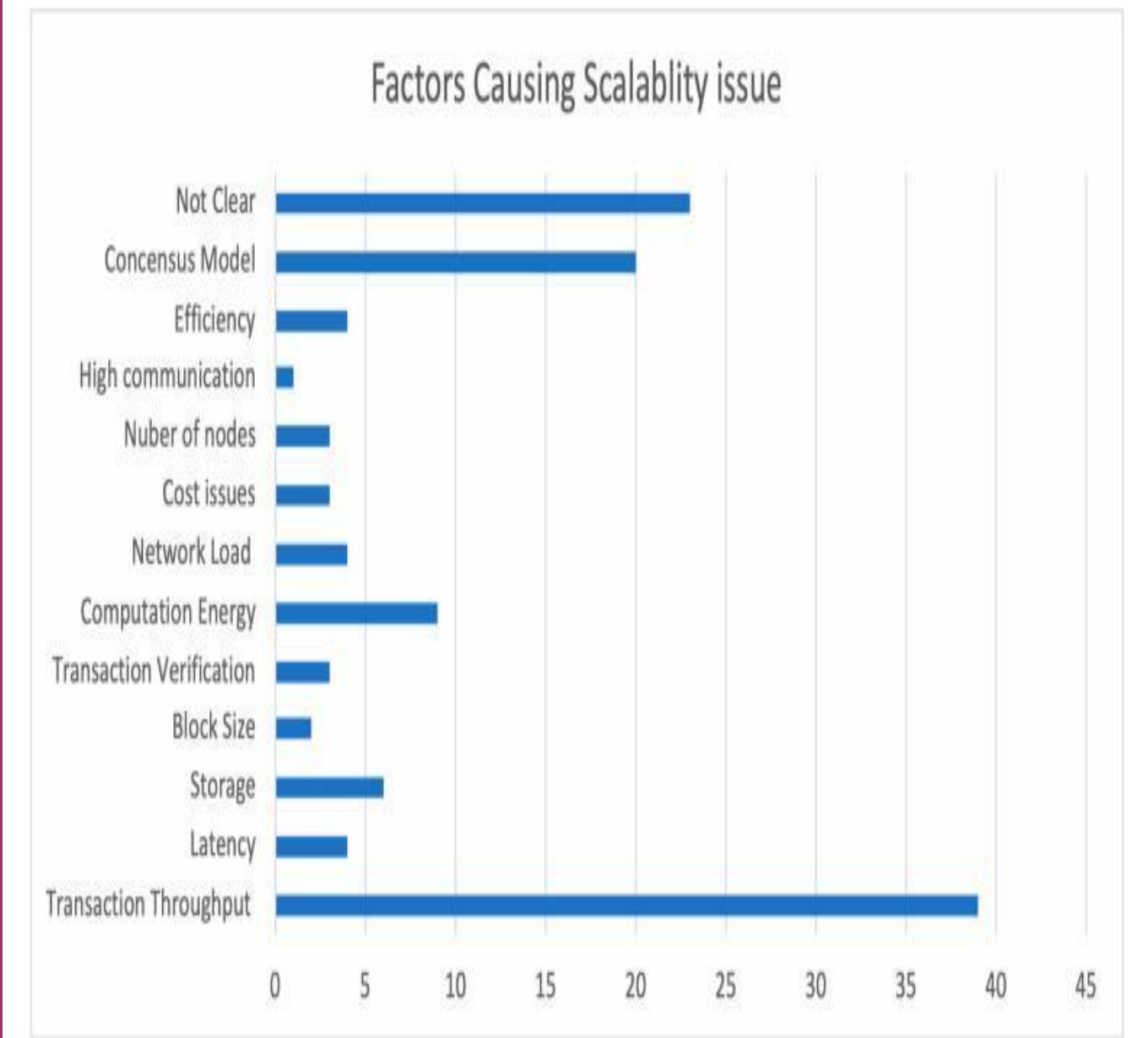


Figure 2. Blockchain consists of continuous linked blocks

Scalability Issue

Blockchain was made famous by Bitcoin in 2008, and since then it has advanced into several industries. There are claims that blockchain is the technology will disrupt the technology ecosystem. Our findings also reveal that although blockchain is very applicable to the IOT applications, it is yet to achieve the preferred outcome due to scalability issues. Blockchain appeared to be influencing and disrupting many other industries such as finance, resource management, healthcare, education and agriculture. The following section discusses the scalability issues based on the consolidated data from the articles reviewed. This is to justify the impact of scalability in the top three blockchain associated applications namely bitcoin, Ethereum, IOT.



References

- [1] Haber, S.; Stornetta, W.S. How to time-stamp a digital document. In Advances in Cryptology-CRYPTO' 90, Proceedings of the Conference on the Theory and Application of Cryptography, Santa Barbara, CA, USA, 11–15 August 1990; Springer: Berlin/Heidelberg, Germany, 1990.
- [2.] Nakamoto, S. Bitcoin: A peer-to-peer electronic cash system. Decentralized Bus. Rev. 2008, 21260. Available online: https://www.usssc.gov/sites/default/files/pdf/training/annual-national-training-seminar/2018/Emerging_Tech_Bitcoin_Crypto.pdf (accessed on 15 June 2021).
- [3]. Tapscott, A.; Tapscott, D. How Blockchain is Changing Finance. Harv. Bus. Rev. 2017, 1, 2–5.
- [4]. Shift, D. Technology Tipping Points and Societal Impact. In World Economic Forum Survey Report; World Economic Forum: Cologny/Geneva, Switzerland, 2015.
- [5]. Zhou, Q.; Huang, H.; Zheng, Z.; Bian, J. Solutions to Scalability of Blockchain: A Survey. IEEE Access 2020, 8, 16440–16455. [CrossRef]
- [6.] Cong, K.; Ren, Z.; Pouwelse, J. A Blockchain Consensus Protocol with Horizontal Scalability. In Proceedings of the 2018 IFIP Networking Conference (IFIP Networking) and Workshops, Zurich, Switzerland, 14–16 May 2018; pp.

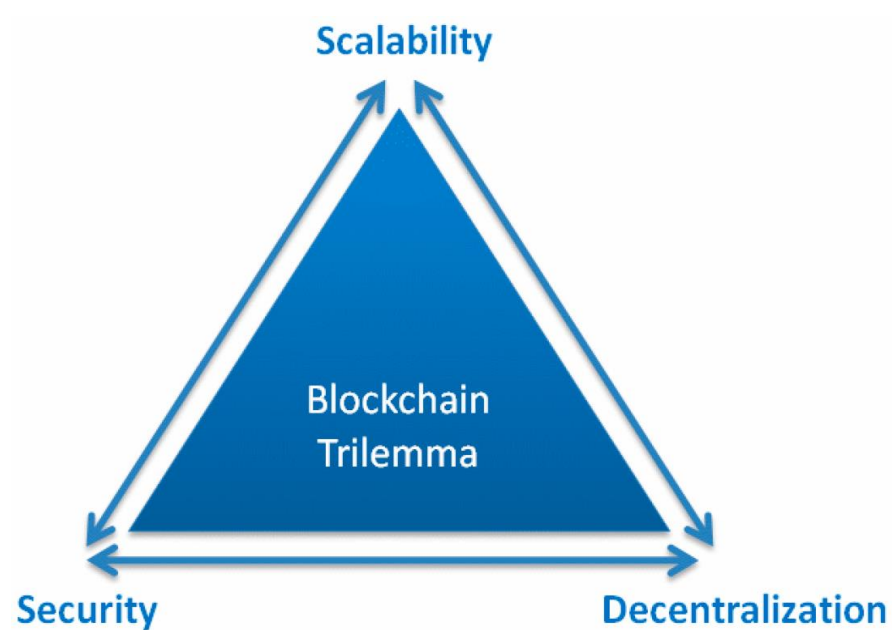


Figure 1 Scalability trilemma.

Blockchain Overview

Blockchain technology is considered “revolutionarily” that it is highly likely to disrupt technology ecosystem in offering feasible solutions for securing data due to these strengths: decentralized features, secure data storing capability, lack of trust, data transaction auditability, and transparent data processing. It offers data immutability against different attacks, and provides more advanced data privacy, data security, and data integrity. It is believed that blockchain technology will potentially disrupt every industry that exists and drastically change all aspects of our lives. A blockchain is a decentralized shared database maintained by a computer node in a peer-to-peer network. The records in the original bitcoin blockchain include transactions between parties concerned with crypto-currency transfer. Both the parties are assigned a private key and public key as per the public key infrastructure (PKI). The identity or transaction address of the parties is established by the public key hash value.

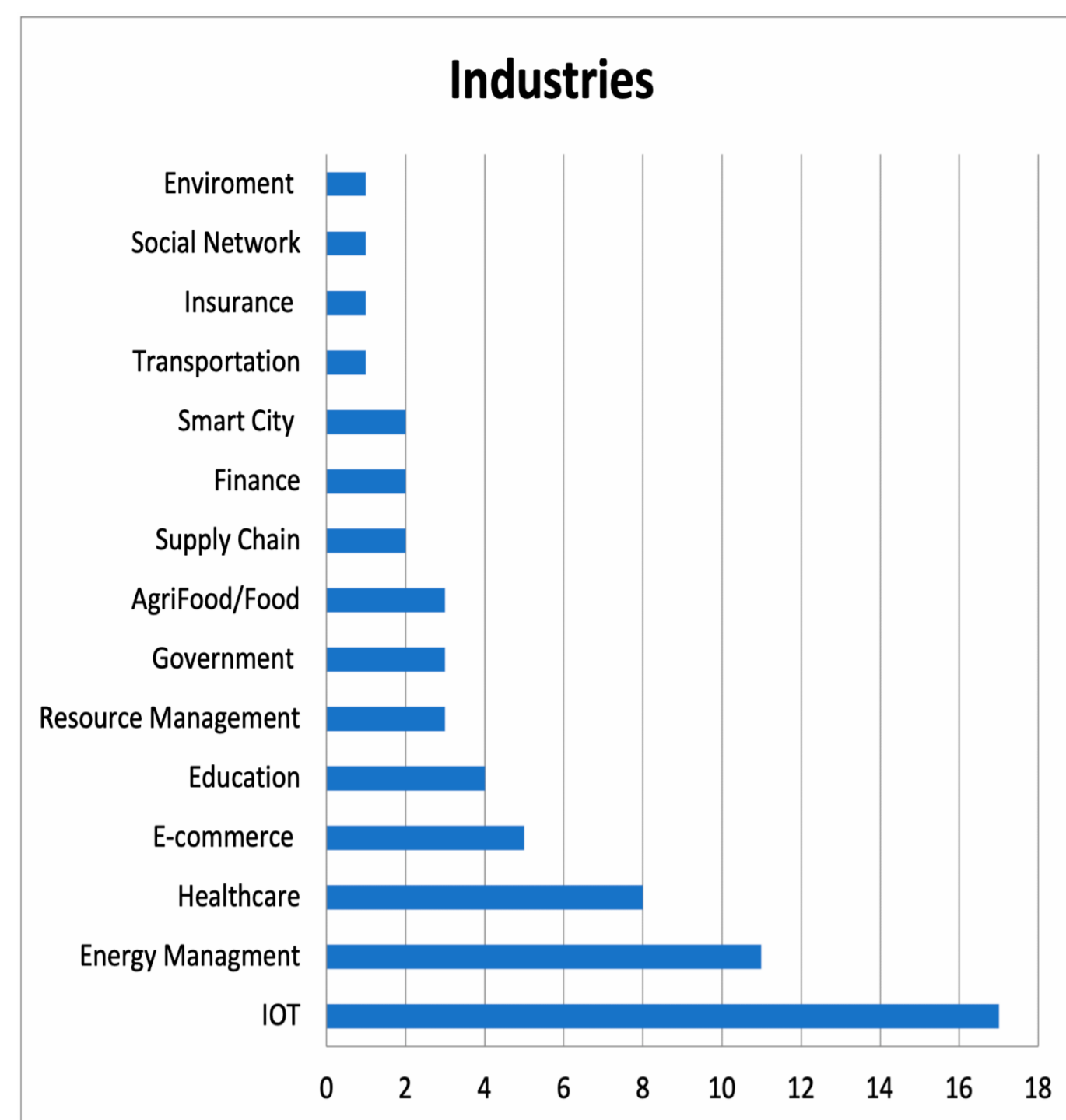


Figure 3. Blockchain application domain per sector

