Chapter 9
Grading the Blockchain Using Sharding

Sabyasachi Pramanik
https://orcid.org/0000-0002-9431-8751
Haldia Institute of Technology, India

Soma Bag
Asadtala Nivedita Kanya Vidya Math, India

Atanu Roy
https://orcid.org/0000-0001-5269-9122
The Neotia University, India

ABSTRACT

Concerns about blockchain's scalability have grown in importance as its use expands. This problem is addressed by sharding protocols, which divide the blockchain network into smaller, more manageable chunks called shards. Each shard manages a distinct set of smart contracts and transactions on its own. This matching step greatly increases a blockchain network's overall throughput. This chapter provides an overview of blockchain technology, examines its fundamental components and operations, and discusses the role that sharding protocols play in improving the scalability and efficiency of the platform. Various sharding approaches have been compared and evaluated. It has also been argued where future research on blockchain technology sharding should go.

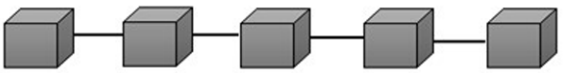
DOI: 10.4018/979-8-3693-3956-5.ch009

INTRODUCTION

Blockchain is becoming a disruptive force in the realm of digital innovation. At its core, blockchain is a decentralized, transparent, and impenetrable digital database for recording transactions. The revolutionary potential of this technology resides in its capacity to remove middlemen, improve security, and provide a trustless environment for a range of applications. Blockchain's influence is transforming traditional paradigms of data storage and transactional procedures in a variety of industries, including finance, supply chain management (Saberi, S. et al., 2019), healthcare (Srivastava, G. et al., 2020), and more. Its roots can be traced back to cryptocurrencies like Bitcoin. This section provides an overview of the core ideas behind blockchain technology and its incredible journey to transform the way we trade, verify, and work with digital assets and data.

A Blockchain: What Is It?

Figure 1. Blockchain techonology



An electronic ledger known as a blockchain is maintained on a network of interconnected computers known as nodes. It serves as a clear and secure way to log and then verify data or transactions. The time of the transaction, the parties involved, and the transaction amount are all stored in each block of the blockchain. The blocks that make up the blockchain are connected to one other. To ensure the integrity of the data, each block is linked to the previous one using a cryptographic technique, creating a chain of blocks.

A blockchain is a distributed digital record that ensures the confidentiality, security, and openness of data or transactions. Because it runs on a decentralized network, manipulation and tampering are difficult to achieve. Beyond virtual currencies, the technology offers a wide range of uses, including enhanced record-keeping, safe transactions, and higher productivity across a range of businesses (Zheng, Z. et al., 2018). Figure 1 illustrates blockchain technology in action.