

Chapter 5


Decentralized Applications and Distributed Ledger Framework

V. Hemamalini

 <https://orcid.org/0000-0001-8237-031X>

SRM Institute of Science and Technology, Kattankulathur, India

M. Jeyaselvi

 <https://orcid.org/0000-0003-3386-5177>


SRM Institute of Science and Technology, Kattankulathur, India

Amit Kumar Tyagi

 <https://orcid.org/0000-0003-2657-8700>

National Forensic Sciences University, Gandhinagar, India

Shabnam Kumari

 <https://orcid.org/0009-0001-5442-3020>

SRM Institute of Science and Technology, Kattankulathur, India

ABSTRACT

Decentralized Applications (dApps) and Distributed Ledger Frameworks (DLFs) represent critical advancements in the realm of blockchain technology, promising enhanced security, transparency, and efficiency. Decentralized Applications, leveraging the inherent properties of blockchain, operate without central control, offering users greater autonomy and reducing reliance on intermediaries. These applications span various domains, from finance and supply chain management to gaming and social networks, demonstrating the versatility and transformative

DOI: 10.4018/979-8-3373-2282-7.ch005

potential of dApps. Distributed Ledger Frameworks, encompassing both blockchain and non-blockchain-based systems, provide the underlying architecture for these applications. DLFs ensure data integrity, immutability, and consensus across distributed nodes, fostering a trustless environment where participants can transact securely. Key frameworks like Ethereum, Hyperledger, and Corda offer diverse features tailored to different use cases, ranging from public, permissionless networks to private, permissioned systems.

1. INTRODUCTION

1.1 Decentralized Applications

Decentralized Applications (DApps) represent a new paradigm in software development, leveraging the power of decentralized networks, most commonly blockchains. In contrast to traditional applications that depend on centralized servers, DApps embrace the inherent qualities of blockchain technology, providing benefits like enhanced transparency, immutability, and security. At the heart of DApps are smart contracts—self-executing agreements where the terms are directly encoded. These smart contracts automate and enforce agreements, eliminating the need for intermediaries, and resulting in more efficient and fraud-resistant applications. Key characteristics that define decentralized applications include (refer figure 1):

- **Decentralization:** DApps leverage the power of decentralized networks, usually blockchains, to distribute application data and processes across many nodes. This inherent decentralization gets rid of a central point of weakness, improving both security and the ability to withstand disruptions.
- **Transparency:** The transparency of blockchain technology enables all DApp participants to view and verify transactions and data, fostering trust and accountability through independent verification of the application's integrity.
- **Immutability:** Once data is recorded on a blockchain, it becomes virtually impossible to modify or alter it retroactively. This characteristic guarantees the integrity of the application's data and offers a reliable, auditable history of transactions.
- **Tokenization:** Decentralized applications (DApps) frequently employ tokens to facilitate value exchange within their platforms. These tokens can symbolize a range of digital or physical assets, allowing for seamless transactions. They also serve to incentivize users and encourage active participation in the application's ecosystem.

36 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/decentralized-applications-and-distributed-ledger-framework/390923

Related Content

Subjective Attack Trees: Security Risk Modeling Under Second-Order Uncertainty

Nasser Al-Hadhrani (2023). *International Journal of Blockchain Applications and Secure Computing* (pp. 1-27).

www.irma-international.org/article/subjective-attack-trees/320498

An Opcode-Based Malware Detection Model Using Supervised Learning Algorithms

Om Prakash Samantray and Satya Narayan Tripathy (2021). *International Journal of Information Security and Privacy* (pp. 18-30).

www.irma-international.org/article/an-opcode-based-malware-detection-model-using-supervised-learning-algorithms/289818

The Role of Privacy Risk in IT Acceptance: An Empirical Study

Joseph A. Cazier, E. Vance Wilson and B. Dawn Medlin (2007). *International Journal of Information Security and Privacy* (pp. 61-73).

www.irma-international.org/article/role-privacy-risk-acceptance/2461

BadAgent Extension: Cross-Domain Robustness and Trigger Visibility in LLM Agents

Pedro Yanes Garrido and Diego Fernandez Arias (2026). *Examining Vulnerabilities and Adversarial Exploitation of AI and LLMs* (pp. 271-296).

www.irma-international.org/chapter/badagent-extension/408787

A Six-View Perspective Framework for System Security: Issues, Risks, and Requirements

Surya B. Yadav (2010). *International Journal of Information Security and Privacy* (pp. 61-92).

www.irma-international.org/article/six-view-perspective-framework-system/43057