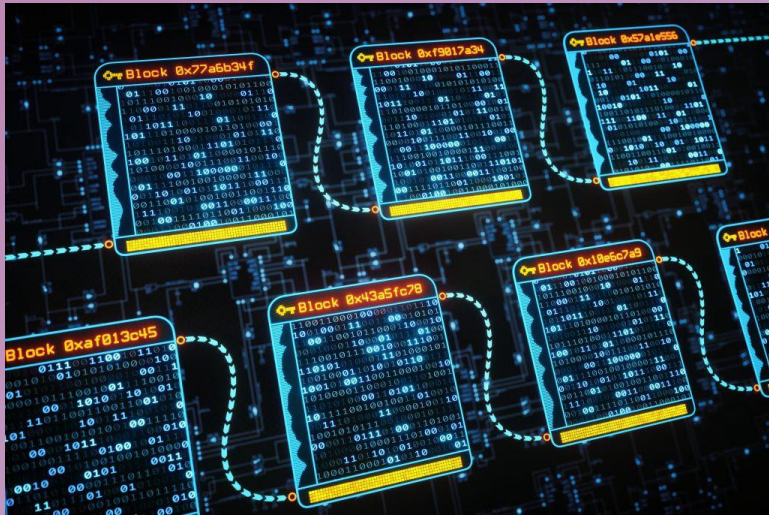# ENHANCING BANKING TRANSACTIONS WITH BLOCKCHAIN TECHNOLOGY : FROM TRADITIONAL MVC/SOAP API TO HYPERLEDGER

SUMMARY OF THESIS BY MOHAMMAD NAJM

INTRODUCTION

Current Banking Infrastructure: Traditional banking relies on centralized systems like SOA and MVC for transactional efficiency but faces issues like single points of failure.

The Rise of Blockchain Technology: Blockchain offers a decentralized ledger system enhancing transparency, security, and efficiency in financial transactions.

The Convergence of Blockchain and Banking: Combining blockchain's zero-trust frameworks with banking promises transformative benefits in scalability and fraud prevention.

PROBLEM STATEMENT

Challenges in current banking systems

Issues with centralized systems

Traditional banking systems are limited by centralization, leading to bottlenecks, high operational costs, and vulnerability to fraud.

Centralized banking faces inefficiencies in scalability and difficulties in real-time transaction management.

OBJECTIVES AND RESEARCH QUESTIONS

- **Aim of the study:** Investigate how blockchain can address inefficiencies and security vulnerabilities in banking.
- **Key Objectives:** Compare traditional architectures with blockchain-based frameworks to evaluate performance, scalability, and security.
- **Research Questions:** Is blockchain viable for modern banking, and how its challenges be mitigated?

LITERATURE REVIEW OVERVIEW

- **Evolution of Banking Technology:** Banking has evolved from manual systems to centralized SOA and microservices, leading to blockchain integration.
- **Legacy Systems vs Microservices:** Legacy systems are efficient but rigid, while microservices offer scalability but face trust issues
- **Blockchain Advantages:** Decentralization, transparency, and security make blockchain an attractive evolution.
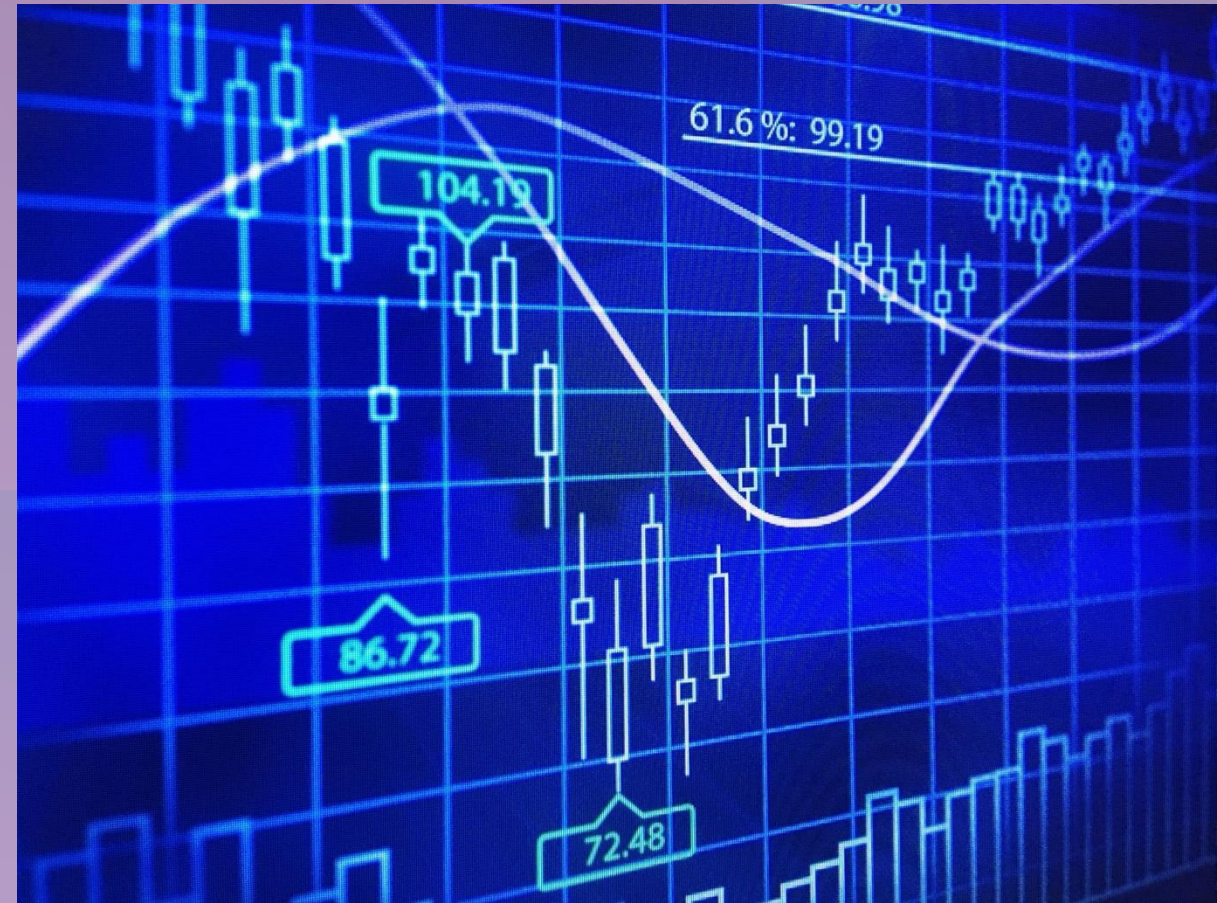
BLOCKCHAIN TECHNOLOGY AND HYPERLEDGER FABRIC

- **Blockchain Overview:** Distributed ledgers promote decentralization, reducing reliance on intermediaries while enhancing security and transparency.
- **Hyperledger Fabric Features:** Permissioned ledgers with modular architecture provide enterprise-grade scalability and privacy.
- **Smart Contracts:** Enables automation of processes like loan disbursements and trade settlements based on predefined rules.

RESEARCH METHODOLOGY

- **Experimental Setup:** Prototypes include microservices with Spring Boot and MySQL, and blockchain using Hyperledger Fabric.
- **Key Metrics Evaluated:** Performance, scalability, security, and resource utilization.
- **Testing Approach:** Load testing with custom scripts to simulate real-world banking scenarios.

IMPLEMENTATION

Development of Two Systems

Banking microservices using Spring Boot and Hyperledger Fabric blockchain prototype

Load Testing

Custom scripts assessed transaction efficiency under stress conditions.

Architectural Comparison

Microservices excel in speed; blockchain ensures security and auditability.

KEY FINDINGS

Performance Comparison

Microservices are faster (39ms/transaction) while Hyperledger Fabric provides robust security (2017ms/transaction)

Scalability Insights

Microservices are easier to scale, while blockchain faces challenges with peer synchronization.

Security Analysis

Hyperledger excels in traceability and fraud prevention, addressing critical banking needs.

SECURITY AND AUDITABILITY

- **Hyperledger Fabric:** Immutable ledgers and cryptographic security ensure unparalleled transaction integrity.
- **Microservices Challenges:** Auditability is fragmented across multiple databases, making traceability more complex.
- **Comparative Insights:** Blockchain provides native compliance with regulations, while microservices require additional orchestration.

RESULTS SUMMARY

Trade-offs identified

Microservices offer speed, blockchain prioritizes security and traceability

Applicability

Microservices suit customer-facing platforms, blockchain excels in interbank settlements.

Real-world Insights

Each system addresses distinct operational needs, emphasizing the importance of context in technology selection.

RECOMMENDATIONS

- **Optimize Blockchain Frameworks:** Leverage modular frameworks like Hyperledger Fabric to tailor performance.
- **Enhance Security Protocols:** Enhance measures like zero-trust architectures to strengthen privacy.
- **Address Scalability Challenges:** Implement dynamic load-balancing and network sharding.
- **Policy and Regulatory Alignment:** Engage with regulators to establish compliance-friendly frameworks.
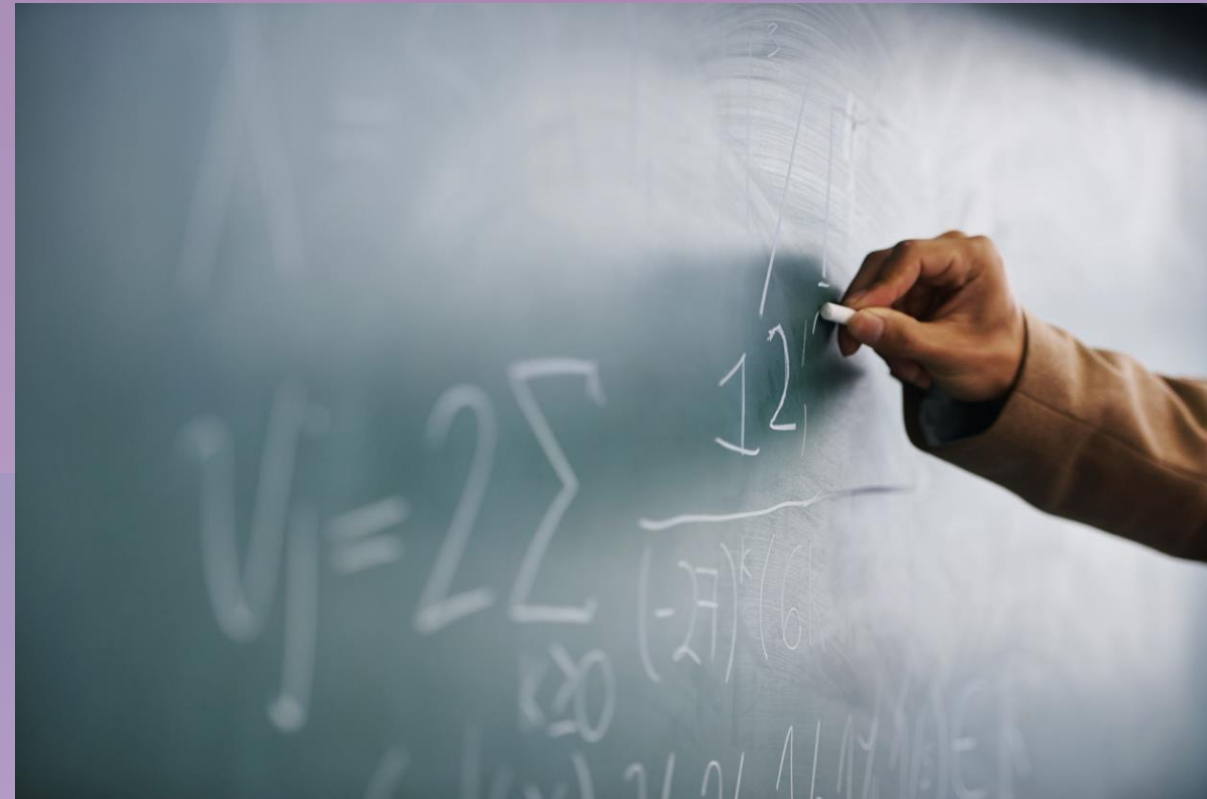
IMPLICATIONS AND FUTURE RESEARCH

- **Scalability and Energy Efficiency:** Future research must tackle blockchain's scalability and environmental impact.
- **AI/IoT Integration:** Leverage AI and IoT with blockchain for smarter, more automated systems.
- **Expansion in Banking Use Cases:** Explore advanced applications in cross border payments and fraud detection.

CONCLUSION

Blockchain's Potential in Banking

Offers transformative capabilities in security, transparency, and scalability.

Adoption Challenges

Trade-offs include higher complexity and slower performance.

Call to Action

Encourage the adoption of blockchain by addressing scalability and regulatory hurdles.

THANK YOU

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