# Introduction:

This report outlines the IBM Blockchain Project titled **'Blockchain-Finance'**, developed by **Siddharth Chaturvedi**, a third-year B.Tech student specializing in **Computer Science and Engineering** at **VIT Bhopal University**.

The project aims to explore the application of **blockchain technology in the financial sector**, with a specific focus on secure, **tokenless banking transactions**. By leveraging the decentralized, immutable nature of blockchain, this system enhances the integrity and transparency of digital financial operations.

The foundational knowledge and skills applied in this project were greatly enriched by the **IBM Blockchain Study Material** offered on the [Adroit ProLearn platform](https://adroitprolearn.in/). The modules provided industry-grade training on topics such as blockchain architecture, smart contracts, and Hyperledger frameworks, which helped bridge academic concepts with enterprise-level implementation strategies.

This project also draws inspiration from the IEEE research paper titled *"Research of a Possibility of Using Blockchain Technology without Tokens to Protect Banking Transactions"* by **N. A. Popova** and **N. G. Butakova**. The paper investigates how blockchain can function effectively without relying on cryptocurrencies or tokens, and this project serves as a **practical implementation** and extension of those research concepts.

The core objective of the Blockchain-Finance project is to utilize hash-based validation mechanisms for banking transactions where each transaction's integrity is verified through a chain of hashes. This helps prevent unauthorized modifications and offers a robust model for future banking systems that wish to adopt blockchain for enhanced security and trust.

# Development:

The Blockchain-Finance project was developed using **Angular CLI version 8.3.21**, chosen for its modular structure and ability to build scalable, single-page web applications. Angular allowed a clean separation of components and services, making the application both maintainable and extendable.

The system supports:

* User registration and login
* Adding funds to a user’s account
* Transferring money between users
* Viewing a complete ledger of all transactions

Key Angular development commands used:

* ng generate component <component-name>: for building modular UI components
* ng generate service <service-name>: for encapsulating business logic and API communication
* ng build --prod: for generating a production-ready build with optimizations

All data flows and actions were carefully integrated with Firebase as the backend to provide real-time database updates and user authentication.

# Testing

To ensure reliability and performance, the system underwent both **unit testing** and **end-to-end testing**.

* **Unit Testing** with *Karma* and *Jasmine*:  
  + Ensured individual components, such as transaction logic and hash validation functions, work as expected.
  + Focused on logic, edge cases, and form validation.
* **End-to-End Testing** with *Protractor*:  
  + Simulated real user behavior for login, fund transfers, and blockchain alerts.
  + Verified the integrity of transaction chaining and system stability under multiple concurrent actions.

Testing allowed fine-tuning the UI, improved responsiveness, and eliminated critical bugs before deployment.

# Dashboard and Features:

The dashboard provides a secure login system. Users can view and perform financial transactions. A Firebase-hosted dashboard demonstrates the core feature of blockchain transaction validation.

The transactions are recorded with:

* From Account, To Account, Amount, Date of Transaction, Transaction ID

- Blockchain metadata: Current Hash, Previous Hash

If any data is tampered, the dashboard detects inconsistency in hashes and alerts the user of blockchain tampering.

# Conclusion:

This IBM Blockchain Project, *Blockchain-Finance*, demonstrates a tokenless implementation of blockchain tailored for secure banking applications. It proves that cryptocurrency i**s not mandatory** to gain the benefits of blockchain such as tamper detection, traceability, and trust.

The development and conceptualization of this project were also guided by the **study material provided by IBM** on their learning platform [Adroit ProLearn](https://adroitprolearn.in/). The comprehensive modules on Blockchain Fundamentals offered a solid foundation that was instrumental in shaping the architecture and logic behind this solution.

By combining blockchain validation with modern web technologies, this project showcases how academic research and industry-certified knowledge can be translated into **real-world applications**

# Citation:

**References:**

1. N. A. Popova and N. G. Butakova, *"Research of a Possibility of Using Blockchain Technology without Tokens to Protect Banking Transactions,"* 2019 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering (EIConRus), pp. 1764–1768.
2. IBM Blockchain Study Material – *Adroit ProLearn*,<https://adroitprolearn.in/>