

# Empowero - A Blockchain Initiative

Aashar C K

*Department of Computer Science  
Muthoot Institute of  
Technology and Science  
Puthencruz, India  
aasharck@gmail.com*

Geo Manuel George

*Department of Computer Science  
Muthoot Institute of  
Technology and Science  
Puthencruz, India  
geomanuelgeorgekolliyil@gmail.com*

Sivaprasad P R

*Department of Computer Science  
Muthoot Institute of  
Technology and Science  
Puthencruz, India  
puthusiva@gmail.com*

Suresh Babu

*Department of Computer Science  
Muthoot Institute of  
Technology and Science  
Puthencruz, India  
sureshbabu01@zoho.com*

Rakhee M

*Department of Computer Science  
Muthoot Institute of  
Technology and Science  
Puthencruz, India  
rakheem@mgits.ac.in*

**Abstract**—Beti Bachao, Beti Padhao initiative will not only introduce various schemes to address the female child-related problems but also encourage people in bringing rational awareness realizing the importance of a girl child. But, because of corruption and improper planning, its success rate ends in a big question. This web application emphasizes on the later issue and elaborates the procedure to mitigate the problems associated with the existing method. Hyperledger, a private blockchain platform, addresses solutions for all existing problems. This paper also provides insights and prospects of using blockchain technology.

**Index Terms**—component, formatting, style, styling, insert

## I. INTRODUCTION

The world is witnessing a great change. And the change is reflecting on social, financial, careers, physical and mental spheres of life. Hitherto, the females had lesser advantages in almost all fields of education and that limited them to do many marvellous things. The world, where ever-growing corruption prevails, thwarts the proper gender equality in education for girl students. This web application will provide a beacon of hope to all girl children who suffer and never got a chance to see their potential in education. Beti Bachao, Beti Padhao initiative is said to be an indispensable step taken by the government of India for the empowerment and well being of girl students across the nation. With the goal of celebrating a girl child and enabling her education, the scheme has the following objectives: Prevent gender-biased sex selective elimination Ensure the survival and protection of the girl child Ensure education for and participation of the girl child [1] Our application aims for the rural upliftment of girl children who are below the poverty line. Beti Bachao, Beti Padhao initiative provides a significant amount for the empowerment of girls but fails to implement it efficiently due to widespread corruption and improper allocation of money. All the problems which hinder this initiative will be addressed by our solution which is implemented through blockchain.

The application relies upon a platform with unparalleled security characteristics, namely, the blockchain. It obliterates the looseness of the network and makes this initiative a robust, reliable, immutable and a secure one. The most prominent private blockchain technologies, which we are using to synthesize a viable web application are Hyperledger fabrics and composer. Hyperledger Fabric is an open-source enterprise-grade permissioned distributed ledger technology (DLT) platform, designed for use in enterprise contexts, that delivers some key differentiating capabilities over other popular distributed ledger or blockchain platforms[2]. Hyperledger Composer is an extensive, open development toolset and framework to make developing blockchain applications easier. One of the primary objectives is to accelerate time to value and makes the integration of our blockchain applications and existing business systems, possible and easier[3]. Hyperledger enables us to create a private business network which also musters options for setting permissions, immutability, decentralisation and performance which is measured by a consensus algorithm[4].

Immutability is one of the primal factors which guarantees that the delicate data should not be tampered with. As Beti Bachao Beti Padao is a government-controlled initiative, several restrictions need to be imposed to make a private consortium network. Like, the public should be able to analyse and view the transaction flow, and its corresponding timestamp. But doesn't have the authority to enrol new members and create new blocks. The members of the blockchain network are given roles and permissions associated with them. This defines a sense of seclusion to the network. And this serves the authenticity and protection of sensitive data.

## II. ARCHITECTURE

### A. Business network archive file structure

A business network is made up of assets, participants, transactions, access control rules, and optionally events and queries.

In the skeleton business network created in the previous steps, there is a model (.cto) file which will contain the class definitions for all assets, participants, and transactions in the business network. The skeleton business network also contains an access control (permissions.acl) document with basic access control rules, a script (logic.js) file containing transaction processor functions, and a package.json file containing business network metadata.[5] This business network archive file can be deployed in local computer or cloud to create a web browser application. These can be easily understood using the following figure.

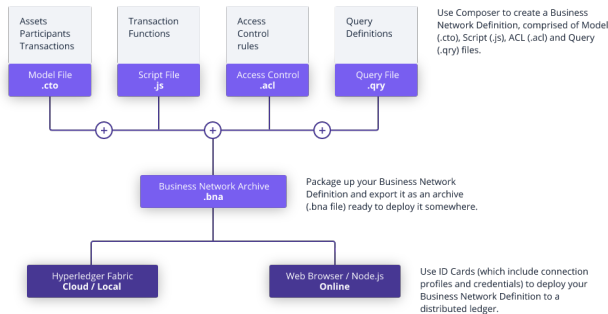


Fig. 1. Business network Archive file structure

**B. Integrating the blockchain network with the front-end application**

Hyperledger Composer enables architects and developers to quickly create "full-stack" blockchain solutions. I.e. business logic that runs on the blockchain, REST APIs that expose the blockchain logic to the web or mobile applications, as well as integrating the blockchain with existing enterprise systems of record.[6]

**III. WORKFLOW AND BLOCKCHAIN COMPONENT IN EMPOWERO**

**A. Workflow scope**

The following figure explains the workflow of the Empowero. At first, the details of every girl students who are under BPL(Below Poverty Line) are verified and forwarded by the school authorities to the admin of the system. The admin is a government-issued person or an organisation who controls the overall rhythm of the network. After the approval of admin, the data is then passed to a coin generation algorithm which outputs the coin value and number of coins for each student. After that, a wallet is created and activated for every student. Efforts took by the intruders, to access and exploit the empcoins, are futile. Because of the value itself doesn't mean that it has a monetary value to buy anything, but the things under our consideration. In our project, the empcoins, which will be allocated in the wallets of verified girl students, can be used to buy stationery items for academic purposes only. When the wallet gets activated the allocated tokens are

transferred to the wallet and students can use the wallet for further transactions with the shopkeeper. The shop keeper will be a government-issued employee, who also has his own login portal for the acceptance and credits of tokens. In other words, the corresponding shopkeeper from which the students buy the stationery will get credited with the monetary value of the EMPCOIN directly from the government thereby ensuring proper allocation and reduced corruption. Even though the admin has a major priority, his access to tokens and wallets are restricted. Algorithms are used for the creation and allocation of tokens throughout the network. In case of emergencies, admin has the power to deactivate the accounts and shut down the network.

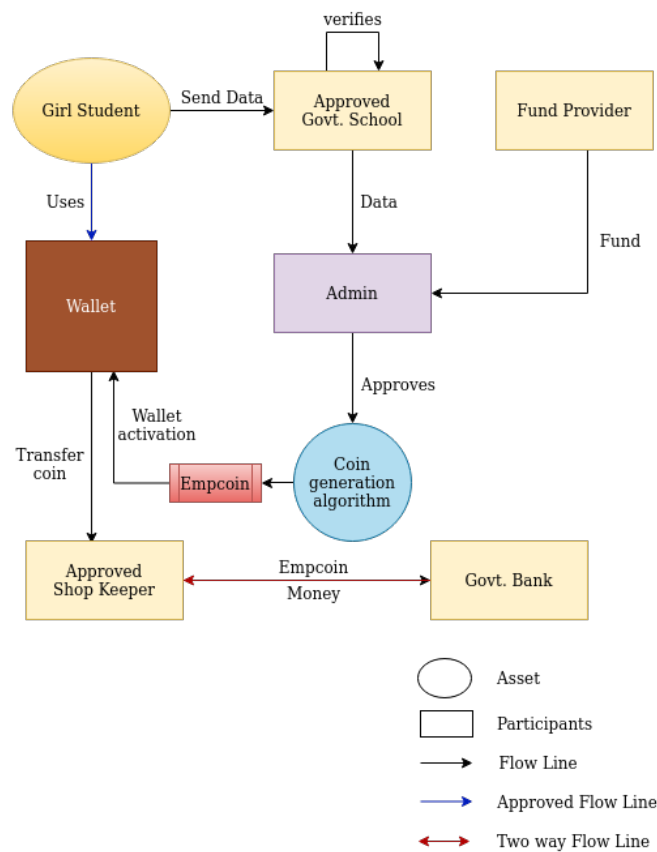


Fig. 2. Data flow diagram

**B. Participants, Assets and Transaction.**

- Participants: The members of the business network.
  - Girl student: Who is from below the poverty line and needs support from the government.
  - School authority: The authority from school who adds the girl students to the network and provides the details regarding attendance.
  - Government officials: They monitor the entire transactions in the network. The generation of tokens from the available fund is done by them.

- Fund source: Most probably the central govt authority who is responsible for fund allocation according to the budget.
- Shop owners: They are selected shop owners who are assigned to provide goods to girl children in exchange for empcoins.
- Assets: Assets can range from the tangible to the intangible. Assets are represented in Hyperledger Fabric as a collection of key-value pairs, with state changes recorded as transactions on a channel ledger.[7]
  - Attendance point: The percentage of attendance obtained by girl children in a year.
  - Empcoin: The Virtual coin used as a substitute of real money in this network.
- Transaction: It will contain the timestamp and transaction id, which are extended to all of the other transactions.
  - Transfer attendance point to govt: The School authority shares attendance details of the girl child with the government using this transaction. The allocation of empcoin to girl children is completely based on the attendance statistics.
  - Transfer token to girl child: This transaction is used for proper allocation of empcoin to girl child based on her previous year attendance statistics.
  - Transfer token to the owner of the shop: This transaction is used in the exchange of service/ goods provided by the shop owner.

#### IV. CONCLUSION

Hyperledger Fabric is an open-source framework that is intended as a foundation for developing blockchain applications. Our application focuses on empowering women in society through providing support in social and economical needs by the use of the most promising technology. The secure way of fund allocation and immutable transaction records makes it safer from corruptions. Similarly, this idea can also be used in various government funds providing schemes and grants.

#### REFERENCES

- [1] beti bachao beti padhao - DARPG 2017 [online] Available : <https://darpg.gov.in/sites/default/files/Beti%20Bachao%20Beti%20Padhao.pdf>
- [2] K. Elissa, "Welcome to hyperledger Fabric. Jan 2018", [online] Available: <https://hyperledger-fabric.readthedocs.io/>
- [3] Welcome to Hyperledger Composer, Oct 2018 [online] Available: <https://hyperledger.github.io/composer/v0.19/introduction/introduction.html>
- [4] Yue Hao, Ping Chen, "Performance Analysis of Consensus Algorithm in Private Blockchain," IEEE Intelligent Vehicles Symposium (IV), 2018
- [5] Developer Tutorial for creating a Hyperledger composer solution [online] Available : <https://hyperledger.github.io/composer/v0.16/tutorials/developer-tutorial>
- [6] Deploying a Hyperledger composer blockchain business network to Hyperledger fabrics. Aug 2019 [online] Available : <https://medium.com/coinmonks/deploying-a-hyperledger-composer-blockchain-business-network-to-hyperledger-fabric-c14a3b2bb746>
- [7] Hyperledger Fabric Model [online] Available : [https://hyperledger-fabric.readthedocs.io/en/release-2.0/fabric\\_model.html](https://hyperledger-fabric.readthedocs.io/en/release-2.0/fabric_model.html)
- [8] Blockchain Performance and Scalability - Hyperledger Fabrics [online] Available: <https://blog.bybit.com/research-and-analysis/blockchain-performance-and-scalability-hyperledger-fabric/>

TABLE I

NETWORK PARTICIPANTS AND THEIR CORRESPONDING PERMISSIONS

Network participants	Permissions		
	Read	Create	Update
Girl Student	✓		✓
Fund provider		✓	
Shop owner	✓		
Government officials	✓		
School authority	✓		✓
Admin	✓	✓	✓

#### C. Scalability problem

In Hyperledger Fabric, the consensus is taken at the ordering service. By adding more peers, you can achieve better concurrency. As the ordering service has pluggable features, its design approach is modular. You can also select scalable consensus mechanisms (Solo, Kafka, and BFT) for application use cases. Kafka is primarily a distributed, fault-tolerant, high throughput message platform, which is batch-handling-capable. The Hyperledger Fabric Kafka ordering mechanism utilizes Apache Kafka to handle real-time endorsed transaction data. The ordering service, which can be set up as a cluster of orders, processes the messages using a Kafka cluster, which ensures that each order process receives transactions and creates blocks in the same order. This event-driven sync design makes for better performances. Kafka consensus is recommended for production use.[8] In our project, we use this ordering function to run the prototype of Empowero.