

Case Study on Birth Registration on Blockchain Technology in Newtown

New Town Kolkata Development Authority (NKDA), as an initiative towards better and efficient governance, has integrated all its major citizen centric services namely record of land, building etc. (mutation); building plan sanction, water connection, birth & death registration, enlistment of trade, profession (trade license); occupancy/completion certificate, assessment and payment of property taxes, into its online portal. This **necessitates**, on the part of NKDA, to **develop** an **infallible system** with a **high-capacity network suitable** for the **Newtown population** base and its future expansion. The system should be **capable of proficient addressal** of the **multiple built-in 'transactions' essential for such online service delivery mechanism**. This also involves **ensuring a secured handling and maintenance of the generated database** which in turn shall help to **inculcate a sense of reliability among the users** or the citizens. This sets the backdrop for NKDA, in association with New Town Kolkata Green Smart City Corporation Ltd. (NKGSCCL), to explore and adopt a befitting technology innovation to ensure an immutable archive of records.

Benefits of Block Chain Technology:

1

Increased capacity- Its capacity to integrate multiple computers shall be the key element to improve the capability of the whole network making it suitable for interfacing multiple users and delivering seamless services to the citizens.

2

Immutability - Blockchain technology functioning through a collection of nodes or decentralized ledger, renders all data absolutely tamper-proof. This plays a pivotal role in ensuring the authenticity of all citizen-related data stored and the information/documents generated, thereof.

3

Irreversibility- Its network being operated across multiple computers/nodes, every transaction is confirmed through all these nodes. This adds to the security of the network and any corruption or other unauthorized access issues that this kind of large database is generally susceptible to, gets addressed in the process.

4

Enhanced Security- The mechanism adopted in storing the data in blockchain technology, provides another layer of protection for the users. This further adds on to the reliability and credibility of the portal.

5

Faster Settlement- Compared to traditional 'banking', blockchain offers closure of any 'transaction' very fast. Hence successful accomplishment of the online services availed across the web portal can be settled in a very short span of time and in an effective manner.

6

Increased capacity- Its capacity to integrate multiple computers shall be the key element to improve the capability of the whole network making it suitable for interfacing multiple users and delivering seamless services to the citizens.

Blockchain technology has been identified as one of the most pertinent 'banking systems' apposite for the multitude of online services catered by NKDA. Blockchain technology is a state-of-the-art digital, decentralized (distributed) ledger that keeps a record of all transactions that take place across a peer-to-peer network. It is an interlinked and continuously expanding list of records stored securely across a number of interconnected systems. This makes blockchain technology resilient since the network has no single point of vulnerability. Additionally, each 'block' is uniquely connected to the previous blocks via a digital signature which means that making a change to a record without disturbing the previous records in the chain is not possible, thus rendering the information tamper-proof.

NKDA has successfully introduced blockchain technology for its online birth registration process since December 2018

It covers birth registration for the entire area of Newtown spanning across Action Area I, II and III. In this short span of time it has already developed a database of 402 entries. It stores data in an immutable fashion with a time stamp at which it was created. Once the birth data are recorded in this technology it cannot be altered/deleted. Further, the birth data can also be verified by querying the blockchain.

**402
entries
completed**

Functionalities in Birth Registration Service for Newtown

Save Birth Record

Check Birth Record

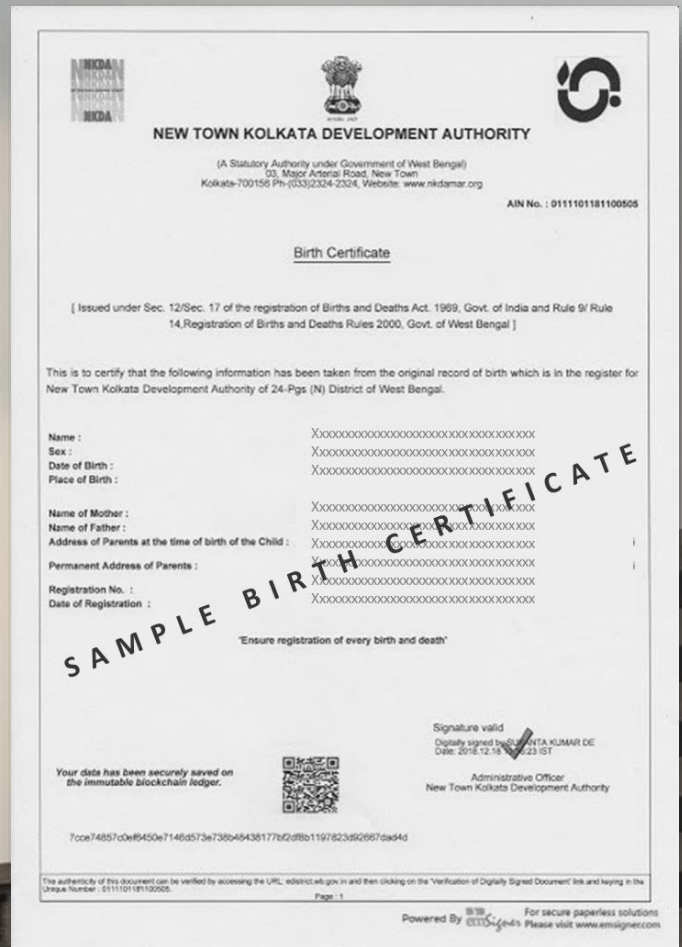
Print Birth Certificate

Save Birth Record- All the input details for the birth registration are entered from e-District system, supervisor captures all the information for the verification and forwards it to administrative officer. After verification, administrator officer data is consequently saved on the blockchain system which triggers the generation of a blockchain id.

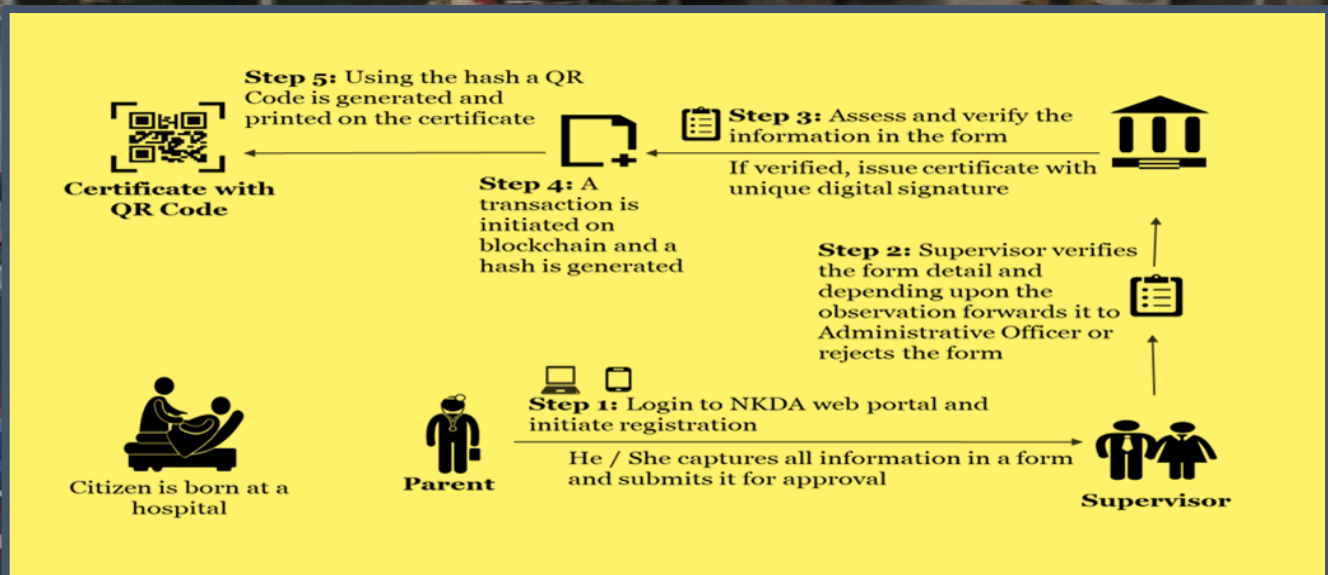
Check Birth Record- To retrieve a birth record from the system user needs to provide the blockchain id as the input which would generate details of the birth registration

Print Birth Certificate- A system generated print-ready version of the certificate to be obtained

For birth registration, all relevant data of the child will be captured from the form submitted by the parent and if Administrative Officer approves the request will be stored as transaction metadata in the blockchain. Any person/organization with the birth certificate can check the authenticity of the document by scanning the QR Code printed on the certificate using NKDA mobile application. When the QR code is scanned the mobile application will search the encrypted block data and transaction hash and will print the data related to the certificate. If the certificate has been tampered in any manner application will notify the user about the same. There will be a time stamp attached to each record which can help trace the birth certificate and know if it existed in past.

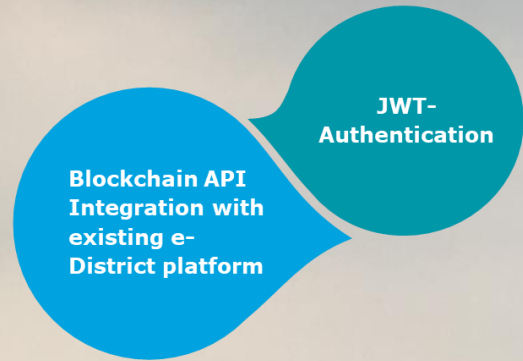


An illustrative example of the process for birth registration as implemented in NKDA:



It is an API based integration approach and a service level integration. For this approach, application developer provides required REST APIs which will be consumed by e-District system.

Key Architecture for Birth Registration Integration in NKDA



Key Aspects of API based Integration are as follows:

- Application developer will provide required web service (REST) and share the service credentials to be consumed by e-District application.
- E-District application will provision for required UI/UX and invoke required service based on the event triggered.
- Based on relevance, e-District application may persist data exchanged through web service API. However e-District application will not hold any business processing logic.

The following has been identified as the services for API based Integration application developer:

- Develop required web service (REST)
- Provide web service credentials to be consumed by e-District application
- Maintain complete business processing logic
- Notify e-District application about the final status of the application.

Other relevant details of the system:

Integration Type:

API based (REST Service)

Technology used:

Blockchain (Multi-chain Blockchain which has four nodes), Node JS, Sql Server 2017, JWT.

Service Details:

In this service Blockchain API have JWT authentication for accessing API only for a single user account with single role. First e-District system should get JWT token from developed solution using user details input which is mentioned below. After getting JWT token e-District system passes the token when accessing the Blockchain API for saving birth record into the Blockchain system. Then JWT server verifies the token which is passed from e-District system. If the verification is successful, then data is pushed into blockchain. After that as a response e-District system gets a transaction hash. The e-District system will get a birth record from the Blockchain system using that hash only. This hash is also used to create the QR Code which is printed on the certificate (This part of printing the QR code using the hash has been developed in e-District system).

NKDA has introduced use of blockchain technology for its **online services for death registration** as well since **February 2019** and has already **secured 365 entries till date**. NKDA envisages appropriate application of this technology for other online service delivery mechanism in near future. NKDA is one such body which holds delivery of citizen-charters as its topmost priority. It has always been keen and active in expanding the range of its services across all sectors of their applicability and all cross section of the society. Integration of such innovation like blockchain technology shall, thus, capacitate NKDA to address a wider base of beneficiaries in a systematic and secured manner; and to fulfill their mandate satisfactorily.