

# Certificate Verification on Blockchain

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**Abstract:** Blockchain is converting internet from not only transfer of information but to transfer of value. In the real world, where we need immutability, transparency and trust blockchain can be used in that domain. Blockchain is the consensus based decentralized, distributed, immutable public/private database which saves the transactions into the blocks over a peer to peer network. It is applicable everywhere be it healthcare, supply chain management, education, finance, voting and so on. There are many fraudulent cases wherein candidates provide forged/wrong college degree to the employer for getting hired. Employers perform various background checks by availing third party services which go to the university to personally verify the degree. This process is for sure time consuming and costly. In this scenario by saving the college degree certificate in an immutable ledger and making an application for the employers collectively to easily verify the college degree of the candidate in minutes lot of time and resources can be saved.

**Note:** The research is being done primarily addressing problems in India. Therefore, some references will be purely according to what is happening in India although the technical solution is independent of any country.

**Keywords:** Blockchain, Education, Certificate verification, Smart Contract

## 1. Need of Study

Nearly 10% Candidates lie on their resumes to get jobs<sup>1</sup>. **Verification of educational background** is a need of the hour for every organization. There are lots of problems associated with this entire process of background checks.

**How is the verification of educational background of a candidate executed?**

- The companies build specialized background check departments to execute this process effectively. It is done by giving a phone call to the concerned institution regarding the verification, formal signed letters are being obtained from universities and sometimes company personnel Visit College for the same.
- National Skills Registry (NSR)<sup>2</sup>
- Outsourcing companies -First India Advantage, Jantakhoj, AuthBridge, HireRight or IDfy.
- National Academic Depository<sup>3</sup>- Government Initiative. (Under Construction)

## 2. Disadvantages of above methods

- a) **Only Physical copy needed** - Organizations who verify by only seeing the hard copy are most prone to fake degree attack. People have lots of ways by which they can get the fake hard copy: -
  - Photostatting - Easiest way to Photostat (print) the format of degree and fill their own details with forged signatures.
  - Diploma Mills- These companies appear to be a higher education institution but are unaccredited and offer illegitimate degrees for a fee. Diploma mills will often be named in a similar fashion to reputable universities, which is intentionally misleading to employers.
- b) **Background Verification Team** - Some organizations have their own team for verification. The problems associated with them are: -
  - The team needs money and resources and organization has to give it to them. So resources are getting wasted.
  - Sometimes it takes time to verify papers (max to 1 month also) because they have to go to universities to verify it and there are always chances of delay from the college/university to give the verification reports.

c) **National Skills Registry-** National Skills Registry is a NASSCOM initiative to have a credible information repository about all persons working in the industry. Limitations of this registry is: -

- The data will be entered by the students only, so there is a chance of entering the wrong information.
- Here, there are background checks before making an account, then the information provided by the student but they are dealing with all the students/professionals which are in millions or billions and they have to do the background check of each and every student independently. That is a tedious process.
- Creating awareness among students/professionals to register on the platform will take a lot of time.
- Since there is no obligation, why would a person take the pain of registering at the portal.

d) **Outsourcing** - Limitations are the same as of background verification team in a company.

e) **National Academic Repository** - The vision of National Academic Depository (NAD) is born out of an initiative to provide an online store house of all academic awards. National Academic Depository (NAD) is a 24X7 online store house of all academic awards viz. certificates, diplomas, degrees, mark-sheets etc. duly digitized and lodged by academic institutions / boards / eligibility assessment bodies.

The main thing is centralized database. If it got hacked, there is no chance the data can be brought back. Also, single point of storage is not tamper proof.

## 3. Scope of Study

**Who needs verification of educational background:**

- 1) Universities
- 2) Colleges
- 3) Companies for hiring process.
- 4) Companies/NGOs/Government who gives fellowship/scholarships to students on basis of their education.

The scope of our application is particularly focused on institutes and companies that recruit students. Colleges and universities usually call every student for documents verification before confirming admission. Companies have a

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full-fledged panel to verify the documents. Both the processes are very time consuming. This application is to help them save time and money and also ensures 100 percent true verification.

#### 4. Objective of Study

The main objective of this project is to eliminate the limitations defined in need of study by making the large database of the college degree of the students. The database should be **tamper-proof, decentralized and distributed** and these properties can be achieved by using **blockchain** as the ledger. The advantage of this database is listed below.

#### 5. Advantages

- 1) Tamper proof immutable ledger - As the blockchain has the speciality of immutable ledger, we can assure that certificates will be saved.
- 2) Decentralized database- As it is decentralized, no one has the monopoly in the network.
- 3) Distributed Ledger - That means if the person wants to hack the database then he will not get the single point of attack.
- 4) Instant Verification - Just enter the unique id of the person and you will able to verify the documents in seconds compare to days which are taken to verify today.
- 5) Eco-Friendliness - As all the work will go digital, there will be no paper usage.

At the end, this will act as **One Stop Verification Portal** for the organizations and save their money and valuable time.

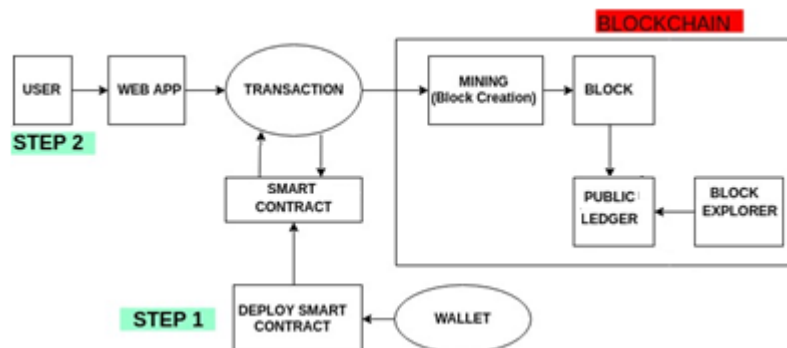


Figure 2: Basic Workflow of a Typical Blockchain Project

**Smart Contract** - A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract. Smart contracts allow the performance of credible transactions without third parties. These transactions are trackable and irreversible<sup>4</sup>.

#### 7. Workflow

##### Issuing Process :-

- 1) Issuer (University) will use the portal to enter the UEN (university enrollment number) of a student and upload the pdf format of the college degree.
- 2) Our portal will take the SHA256<sup>5</sup> of the degree.
- 3) Then it will execute the function of the smart contract which finally saves the hash and some other details of a student against its enrollment number on the blockchain.

#### Stakeholders

There are clearly three stakeholders in our application: -

- **Issuer-** Issuer is the person/organization who issues degree to the students, most of the times these are Universities.
- **Student-** Clearly, students will accept degrees on blockchain. After that, they don't need to carry the physical copy of their degree every time.
- **Verifier-** These are the people/organizations which needs to verify the person's degree to give them admission in their college or job in their organization.

#### 6. Proposed Model

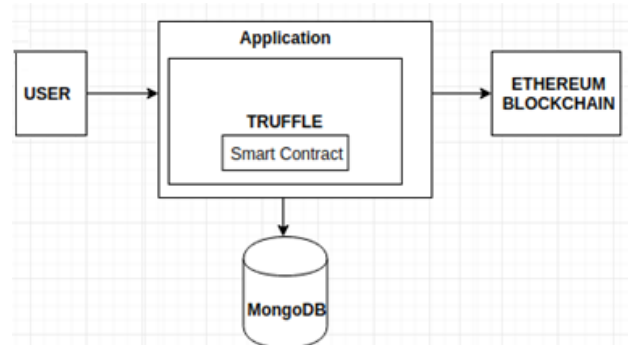


Figure 1: Architecture

##### Verification Process:-

- 1) For verification, the verifier will enter the enrollment number of a student and upload the provided pdf of the college degree.
- 2) Our portal will fetch the original sha hash which is saved against the given enrollment number.
- 3) It will take the hash of the uploaded degree.
- 4) It will match the original hash with the current hash.
- 5) If they match, degree is verified otherwise verification of the degree failed.

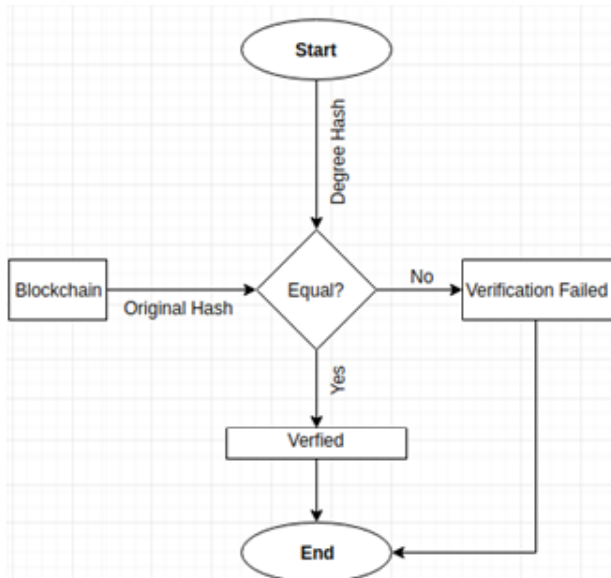


Figure 2: Verification Process Flow Chart

[5] IPFS -

[https://en.wikipedia.org/wiki/InterPlanetary\\_File\\_System](https://en.wikipedia.org/wiki/InterPlanetary_File_System)

[6] BlockCerts - <https://www.blockcerts.org/>

## 8. Future Scope

- 1) We can save the encrypted pdf of the degree on IPFS<sup>6</sup>(InterPlanetary File System) and student can fetch it and decrypt it using its private key. It will be advantageous for the student as if the pdf of the degree given by the university will be lost even then it can fetch the degree by going to our portal.
- 2) We can extend this project to add the marksheets of the student on the blockchain so that it can be fetched and verified anywhere. It will become a certificate wallet of the student.

## 9. Conclusion

Blockchain is not the world savior or it will not curb poverty. But if we use the power of blockchain wisely it can impact the business and society in a most wonderful way you can expect. I would like to mention the impact our project will create when it will get implemented in real world: -

- Shortens the verification time of the college degree from 2-3 days to 10 minutes.
- The money employer has to spend by going to the university for the physical verification or outsourcing the verification process cuts nearly to zero.
- Resource which an organization has to put solely on the verification process, is minimized.

## References

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