Digital Certificates using Blockchain

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Problem Statement

- The problem here is the wide forgery of School, Bachelor and Masters Degrees in Egypt which may have disastrous impact on the society and the inconvenience of the process of requesting and issuing a certificate and the huge waste of time it costs.

Introduction (1/3)

- 94% of the forged certificates in Kuwait were Egyptian in 2018.
- 44 of the 47 fraud certificate cases were Egyptian universities.

Introduction (2/3)

What is Blockchain?

Characteristics of Blockchain:

- Consensus
- Provenance
- Immutability
- Finality

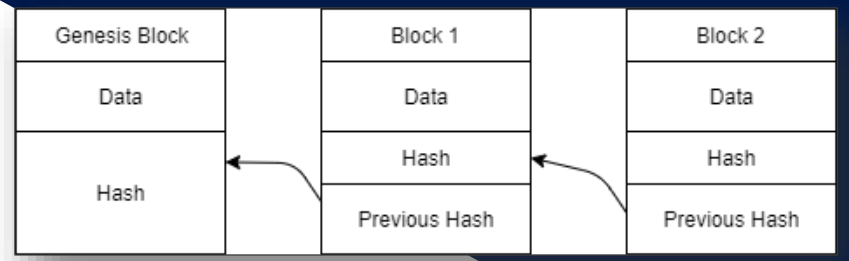


Figure 1: Blockchain

Introduction (3/3)

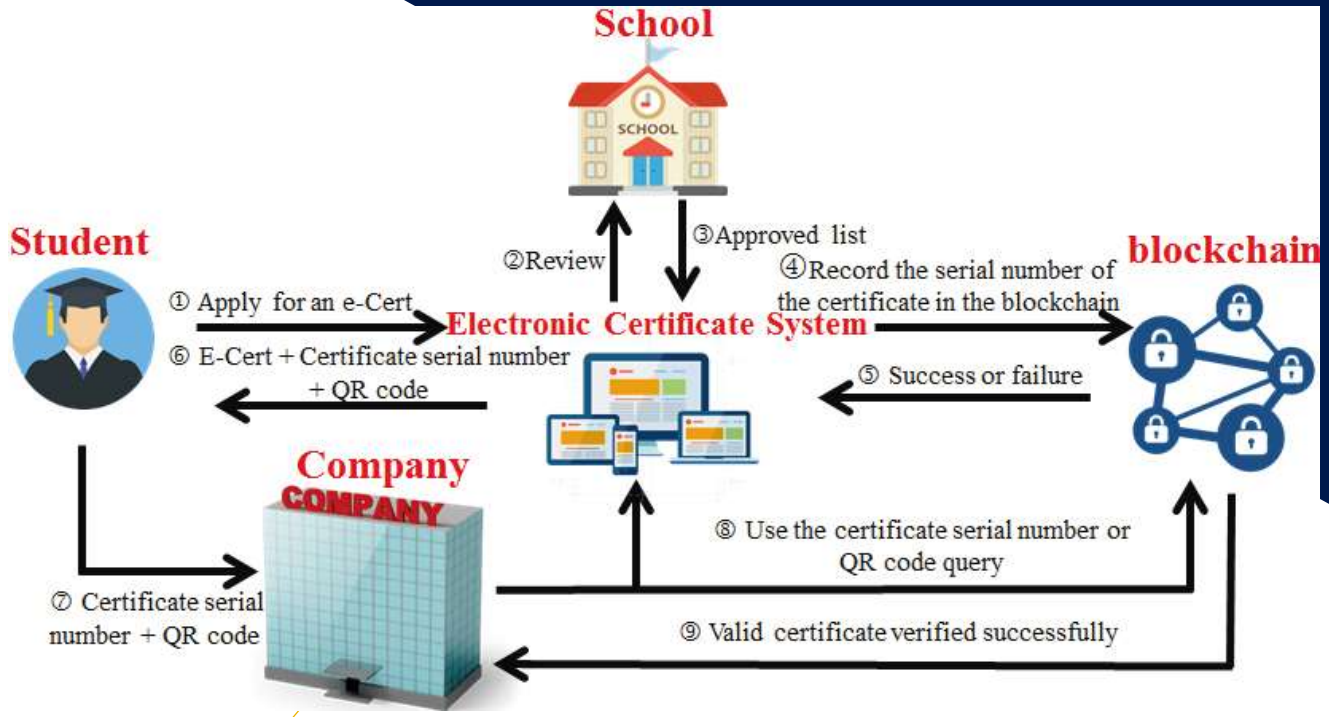
Types of Blockchain:

- Public
- Private
- Permissioned

Related Work

Blockchain and Smart Contract for Digital Certificates. (2018)

- Technologies used:
  - Ethereum Virtual Machine.
  - Solidity
  - Smart Contracts
- Outcome:
  - An Electronic-Certificate.
  - QR code and Serial Number.
  - Data recorded on the Blockchain



Technologies

Hyperledger Fabric: (Used)

- Private permissioned blockchain.
- Includes Smart Contracts.

We also tried:

- Hyperledger Indy: (**Not Used**)
- Etheruem Blockchain: (**Not Used**)

	Ethereum	Hyperledger fabric	Hyperledger indy
Purpose	For business and generalized application	General purpose and high flexibility of permissions	built for decentralized identity
Mode of Peer Participation	Permissionless, Public	Permissioned, Private	Permissioned, Public or Private
Consensus Mechanism	Proof-of-Work algorithm	No mining required	No mining required
Smart contract	Smart Contract written in (e.g., Solidity)	Smart Contract written in (e.g., Go, JavaScript (Node.js))	Not supporting any smart contract
Cryptocurrency	Cryptocurrency called ether	No built-in cryptocurrency	No built-in cryptocurrency
Governance	Ethereum developers	Linux Foundation	Linux Foundation

System Overview(1/2)

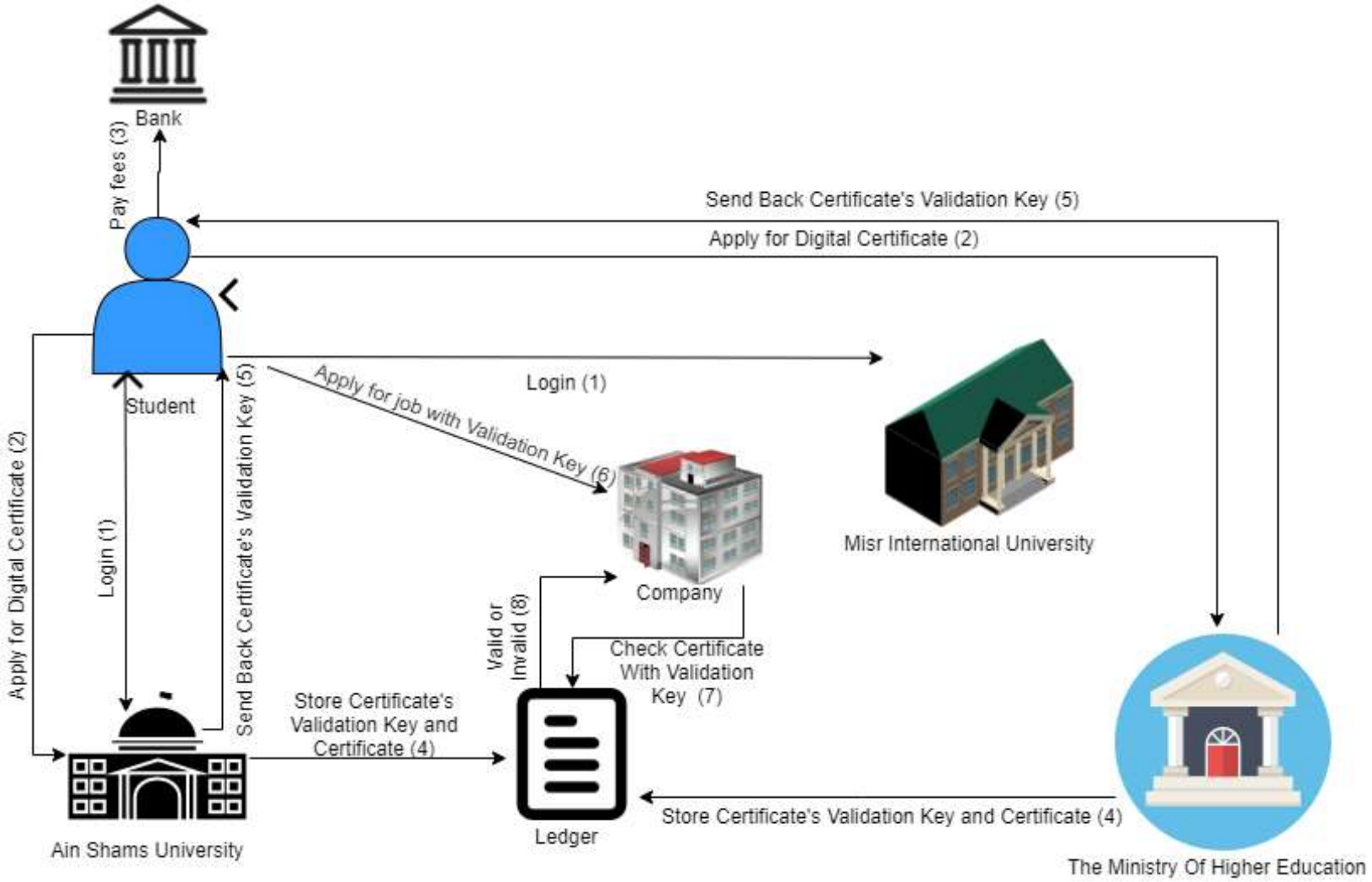


Figure 4: System Overview.

System Overview(2/2)

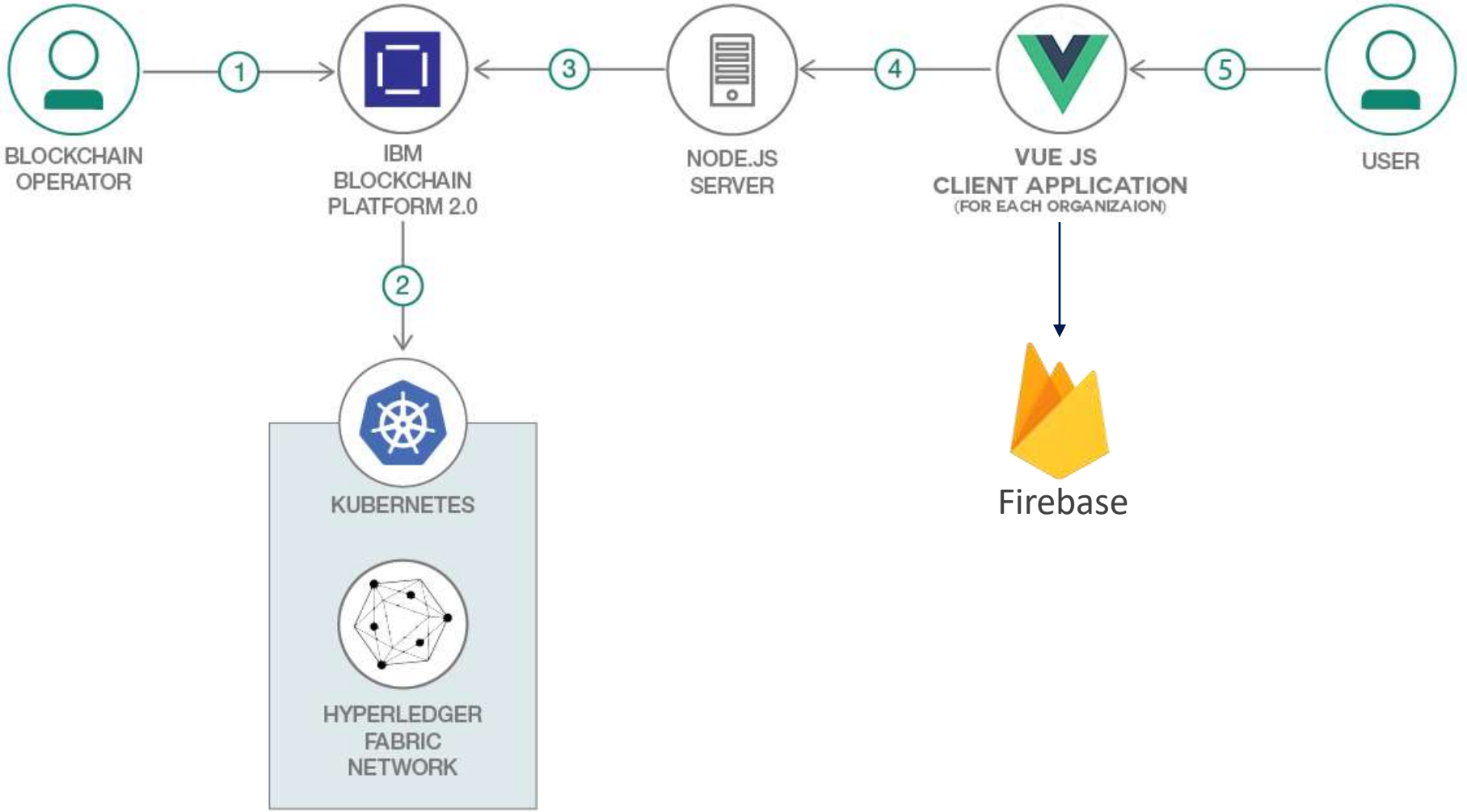


Figure 5: System Overview.

Network Topology

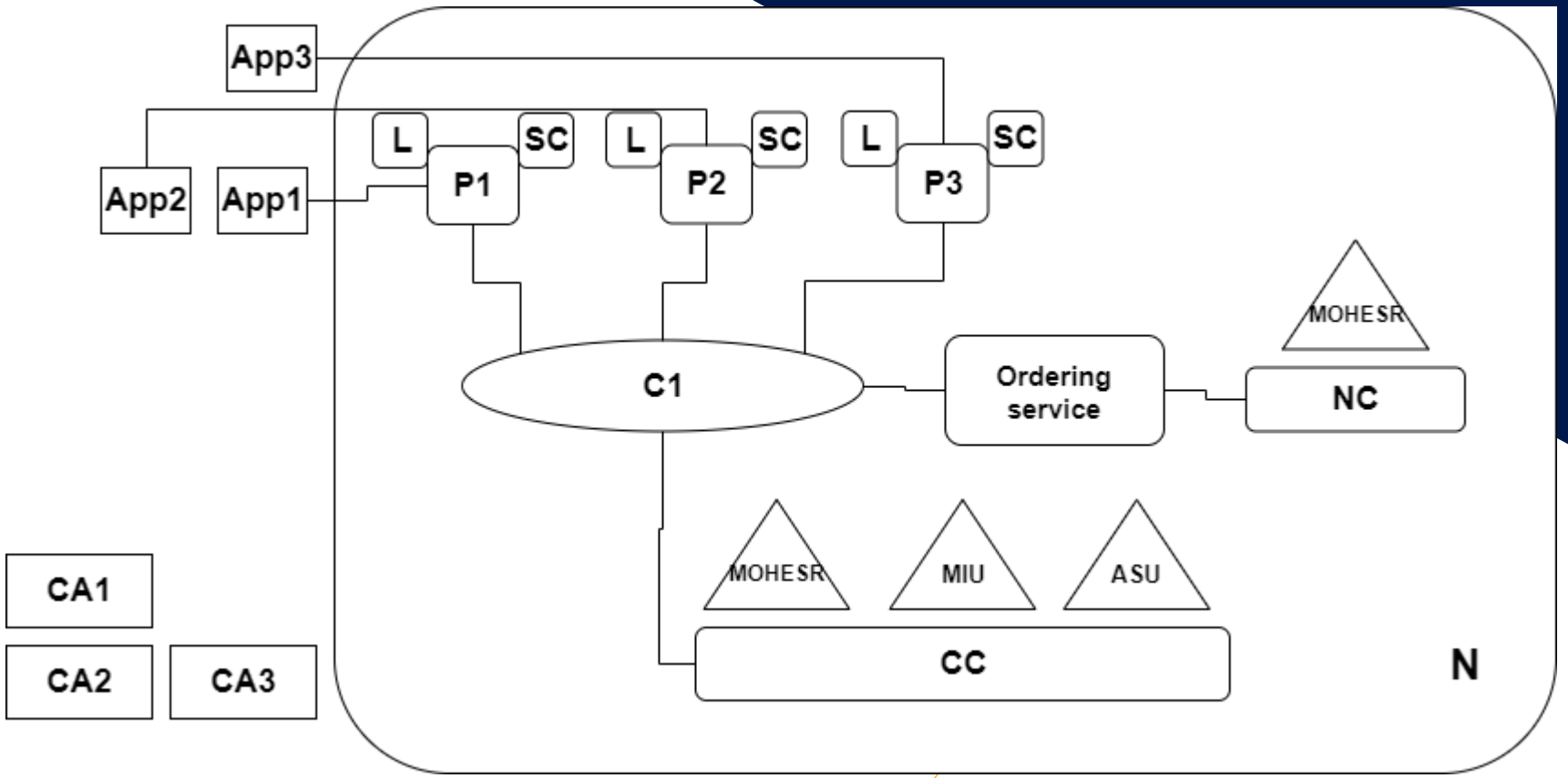
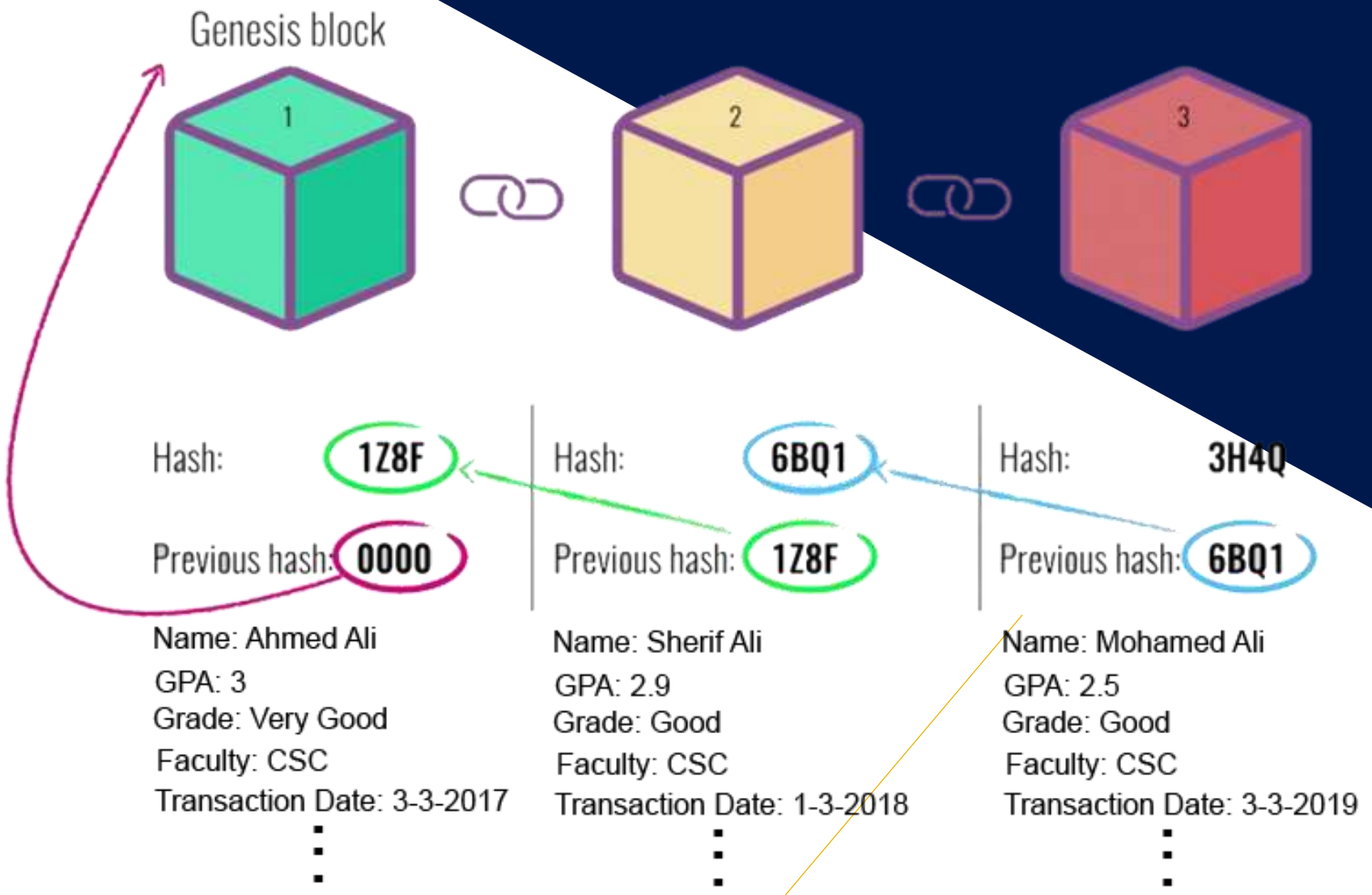
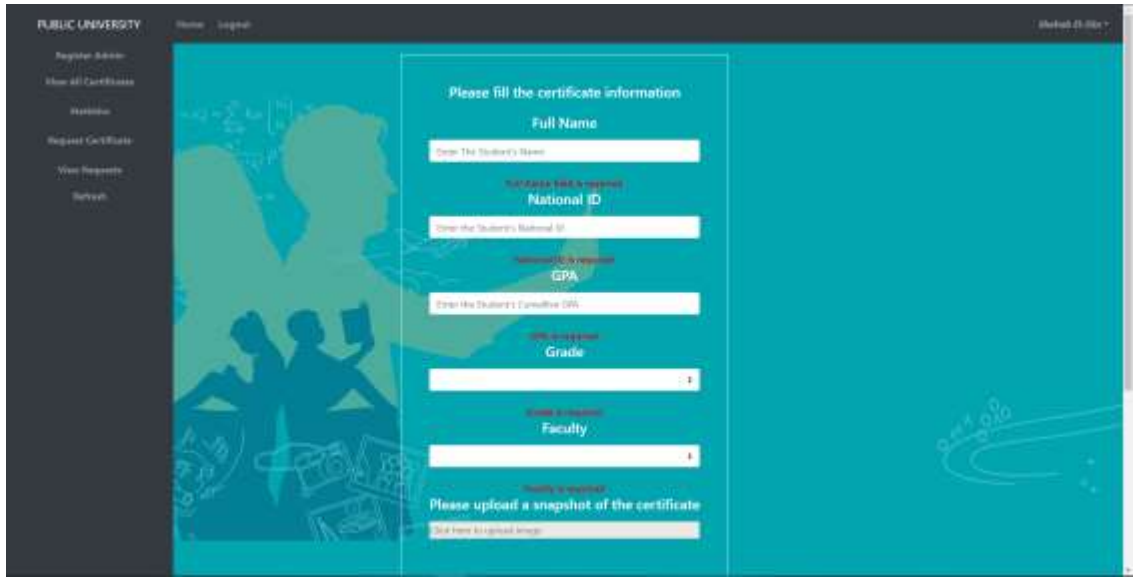


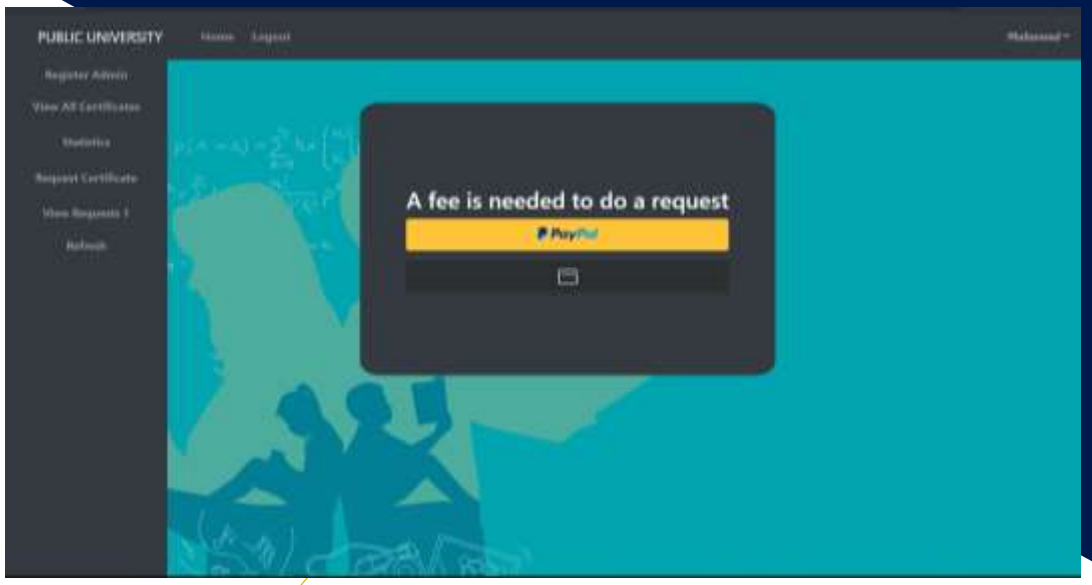
Figure 14: Network Topology.

Blockchain Representation

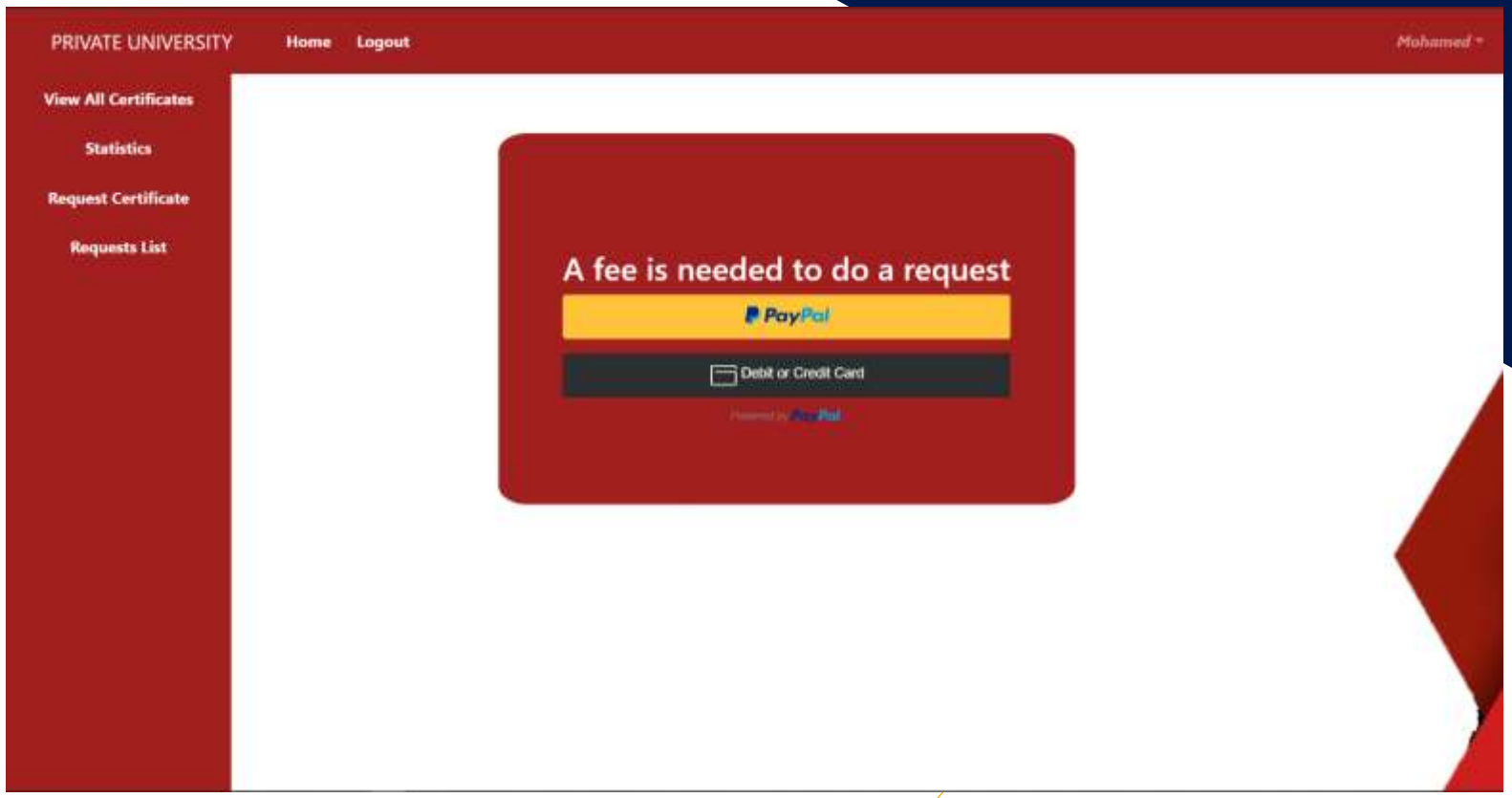


GUI (Graphical User Interface)(1/3)

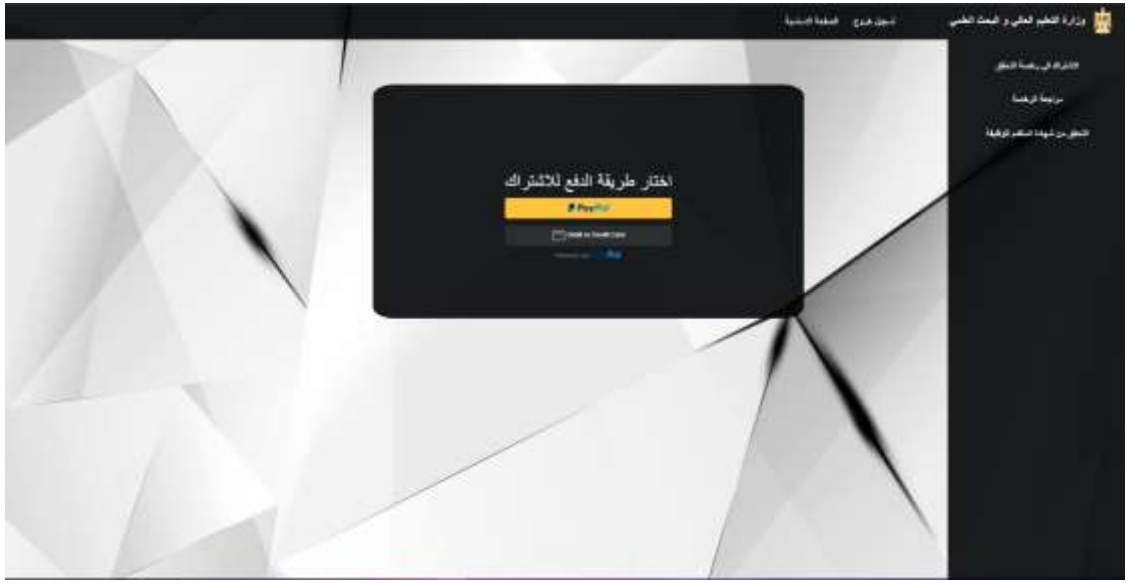


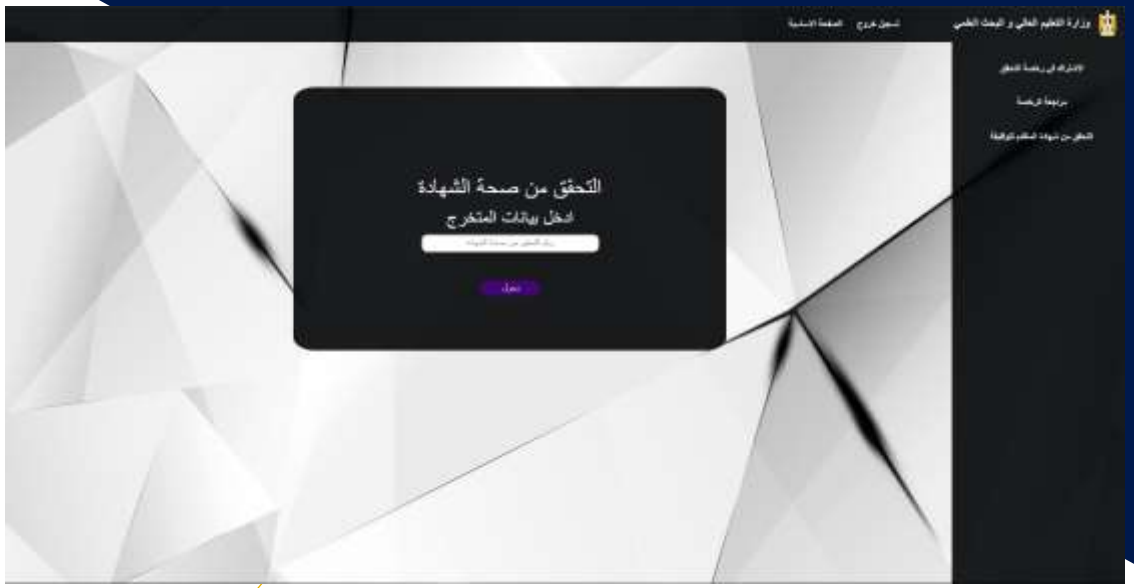


GUI (Graphical User Interface)(2/3)



GUI (Graphical User Interface)(3/3)





Results

- Ministry of Education and Public Universities will be able to put students certificates on the blockchain.
- Students will have easier access to their certificates than the traditional way.
- Companies and employers will be able to verify the certificates of their employees or who applied for a job.
- Since certificates were digitized they can be used for statistical analysis easily.
- Most importantly the certificates will be secured from forging.

Paper Submission:

- 9th International Conference on Software and Information Engineering (ICSIE 2020)

Notification of Acceptance of ICSIE 2020-E062

icsieconf <icsieconf@163.com>
to alley1602890, mohamed1608694, sherif1611233, shehabEldin1603312, ayman.nabil, Radwa.mohamed

Mar 3, 2020, 11:43 AM (3 days ago)

Dear Alley El-Dorry, Mohamed Reda, Sherif Abd El Khalek, Shehab El-Din Abo El-Rejal, Ayman Nabil and Radwa Mohamed,

Thank you for your waiting.

After reviewing, the reviewer recommend that your paper can be included and published into the following journal. **Journal of Advances in Information Technology (JAIT)**, which will be indexed EBSCO; Google Scholar; CrossRef; etc. If you choose publish your paper in JAIT journal, you can have 100$ discount during your registration.

But if you don't want to publish the paper in the journal, you can choose include and publish your paper into ICSIE 2020 conference proceeding by International Conference Proceedings Series by ACM (ACM (978-1-4503-7721-8). Which will be indexed by **Ei Compendex** and **Scopus**.

For more information, pelase refer to the attached notification of acceptance.

Any Questions?

Thank You