



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.

Objective

- Providing a **Secured** and easy way to **Issue** certificates with the ability to **Validate** these certificates when applying for a job by using blockchain.

Related Work (1/2)

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



Figure 1: Validated Certificate.

Related Work (2/2)

SmartCert BlockChain Imperative for Educational Certificates. (2019)

- Technologies used:
 - Ethereum Virtual Machine.
 - Smart Contracts
- Outcome:
 - An Electronic-Certificate.

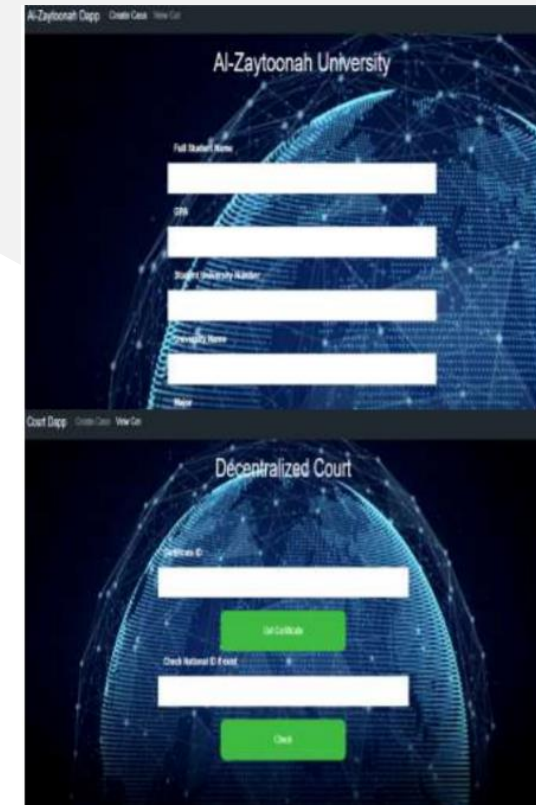
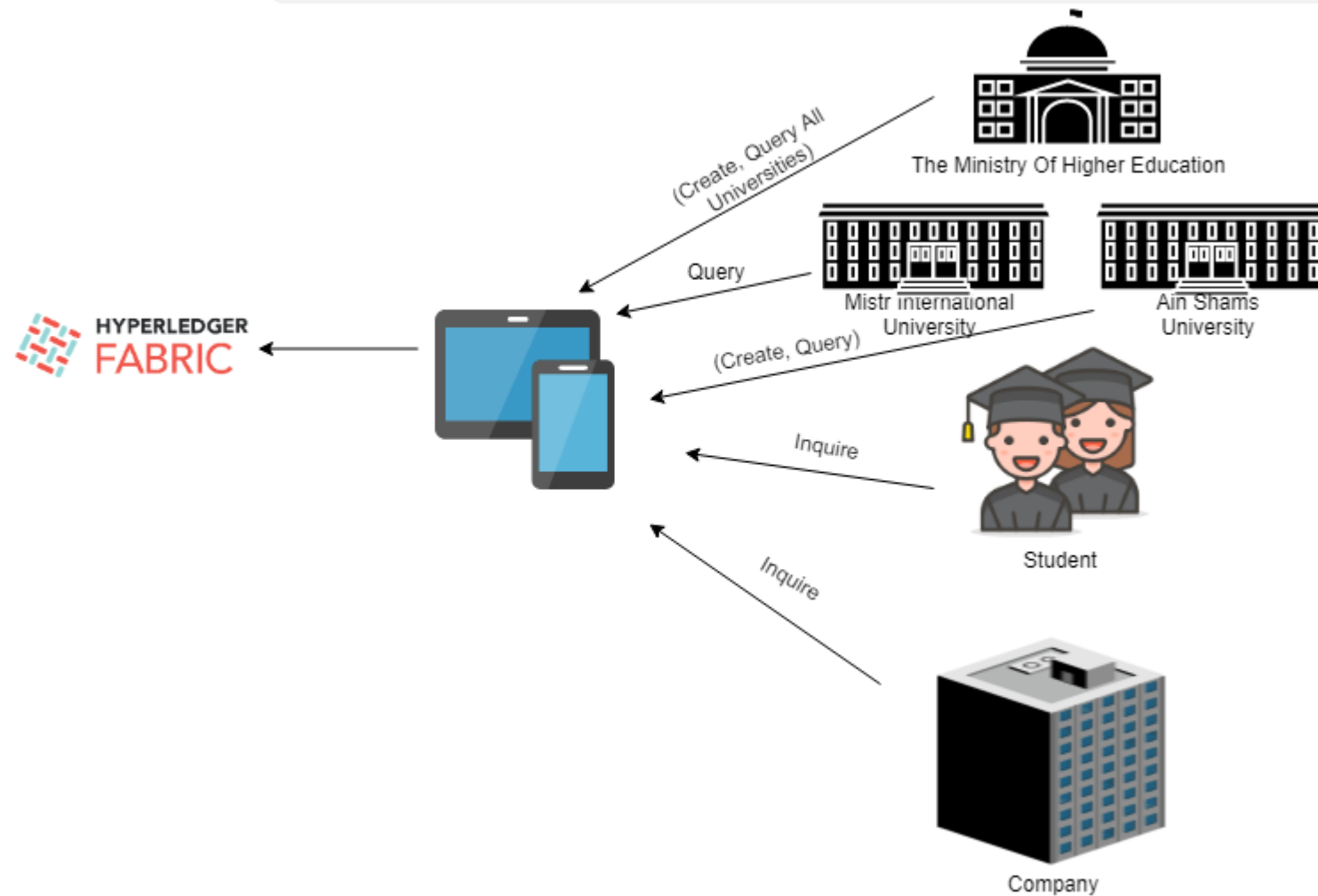
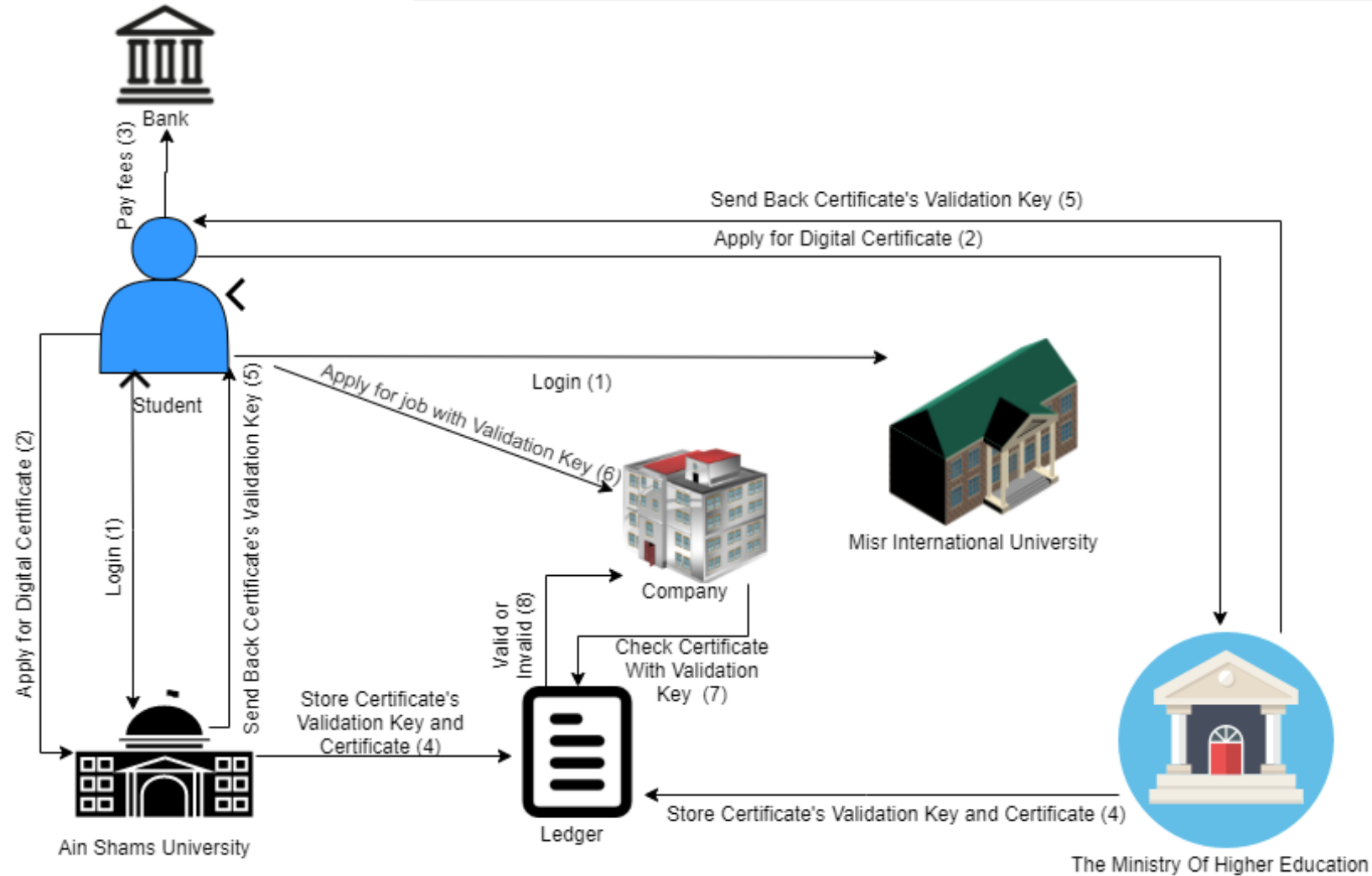


Figure 2: Application UI.

System Participants



System Overview



Business Model



Functional Requirements (1/4)

1) Issue Certificate.

Function Title	Issue Certificate
ID	FR2
Description	For issuing a certificate for student.
Action	Issuer creates a certificate and adds it to the blockchain then sends to the student a validation key and a QR code
Input	transaction context, Certificate Data, Student national ID
Output	Validation key and QR code
Pre-condition	Logged in as a public university or MOHESR Admin
Post-condition	a new transaction is added to the blockchain and the world state.

Functional Requirements (2/4)

2) Read Certificate.

Function Title	Read Certificate
ID	FR3
Description	For querying a transaction data (certificate) from the world state.
Action	Reads the value of a specific key.
Input	transaction context, Certificate validation key
Output	Certificate Data
Pre-condition	Logged in as public/private University Admin or Mohesr Admin
Post-condition	N/A

Functional Requirements (3/4)

3) Validate Certificate.

Function Title	Validate Certificate
ID	FR8
Description	For the recruiting organization to check the validity of the applicant's graduation certificate.
Action	Check the blockchain for a non expired certificate with a specific validation key
Input	Certificate validation key
Output	The certificate of the applicant in case if there is a valid one , if not it will show a message informing that
Pre-condition	Logged in as a recruiting organization
Post-condition	certificate validated

Functional Requirements (4/4)

4) Certificate Exists.

Function Title	Certificate Exists
ID	FR1
Description	For Checking if a certificate exists in the world state.
Action	looks for a certificate with specific key in the world state.
Input	transaction context, Certificate validation key
Output	True or False
Pre-condition	Logged in as public/private University Admin or Mohesr Admin
Post-condition	N/A

Non-functional Requirements



- Reliability



- Security



- Portability



- Scalability



- Usability

Use Case (1/3)

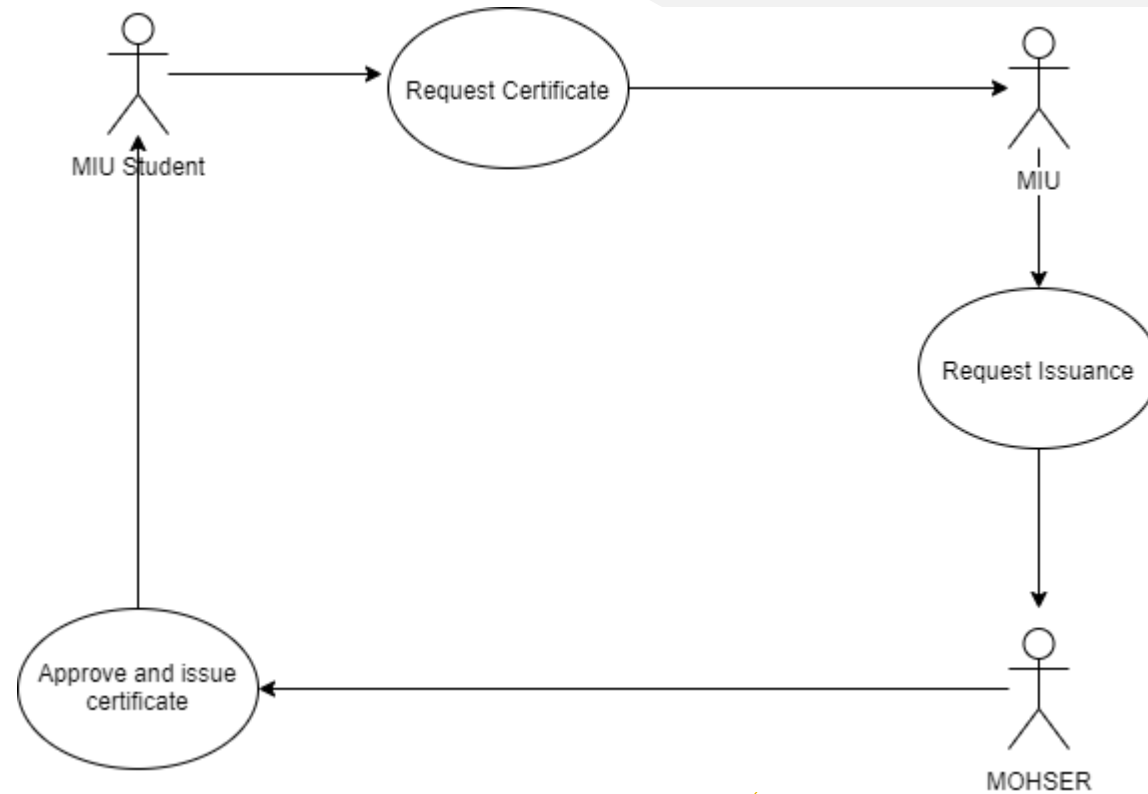


Figure 5: Private university certificate issuance

Use Case (2/3)

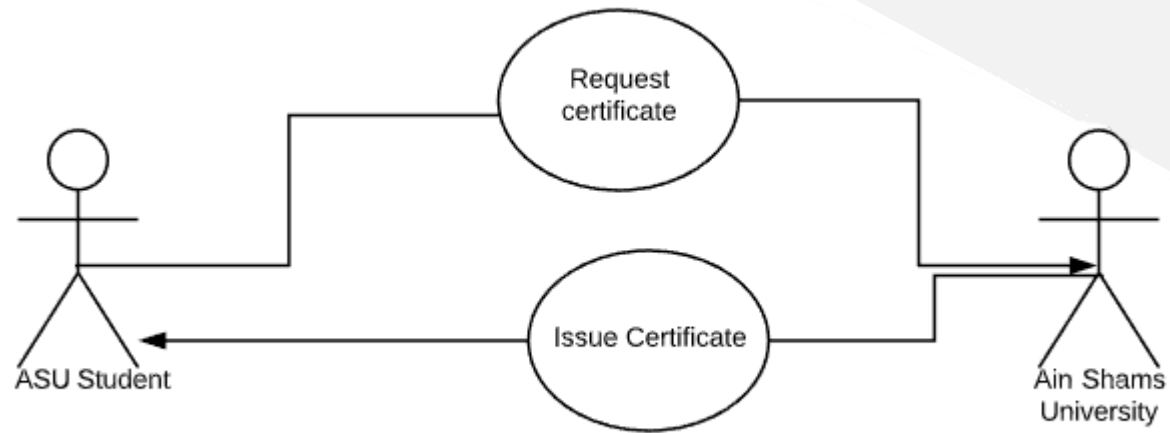


Figure 6: Public university certificate issuance

Use Case (3/3)

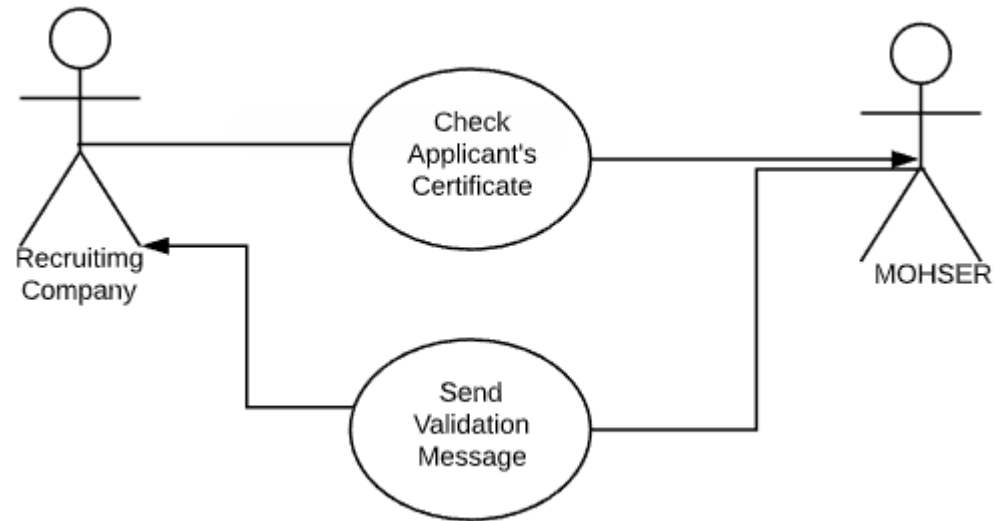


Figure 7: Student applies for a job in a company.

Class Diagram (2/3)

1) Model Overview.

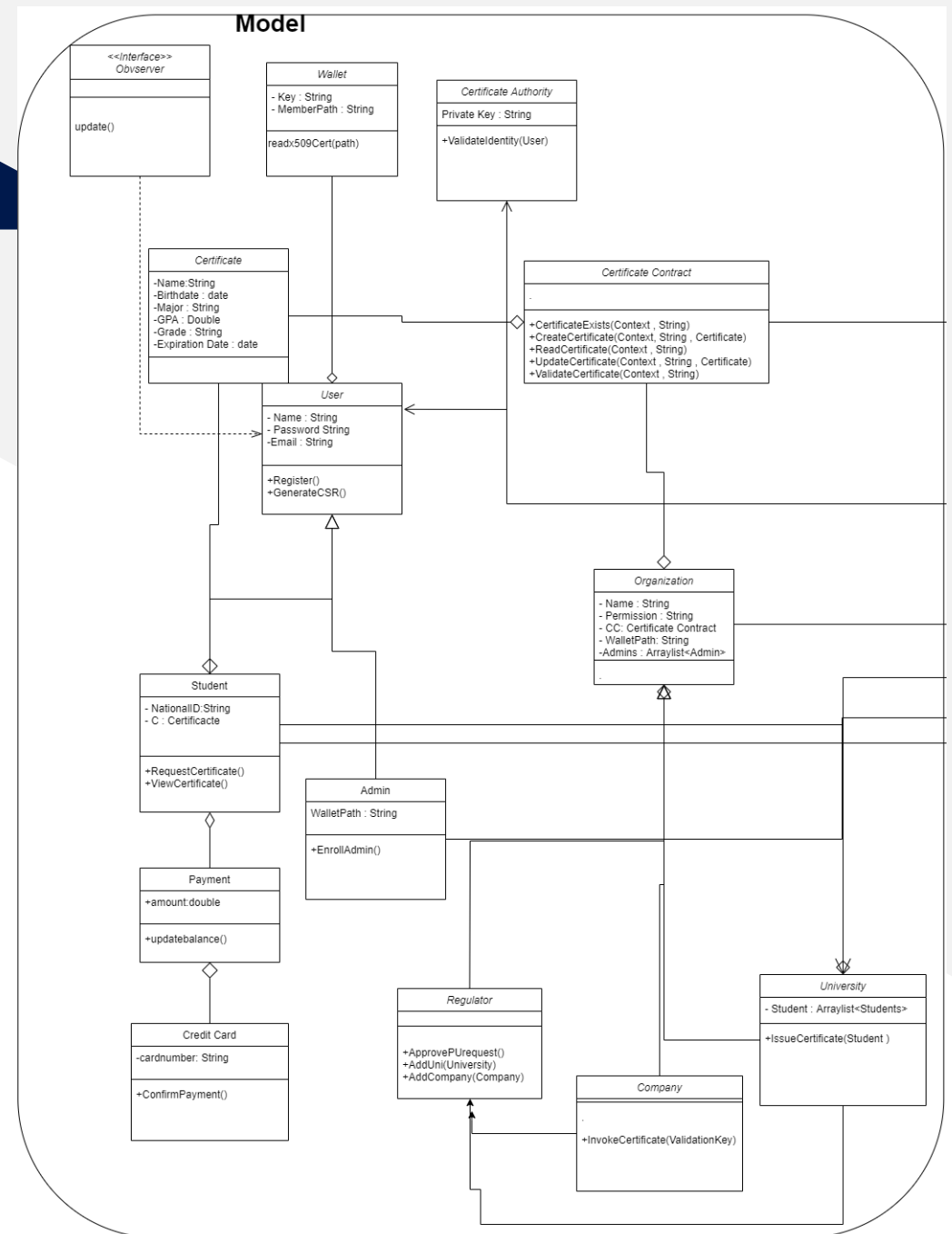


Figure 9: Model Diagram.

Web UI (1/3)

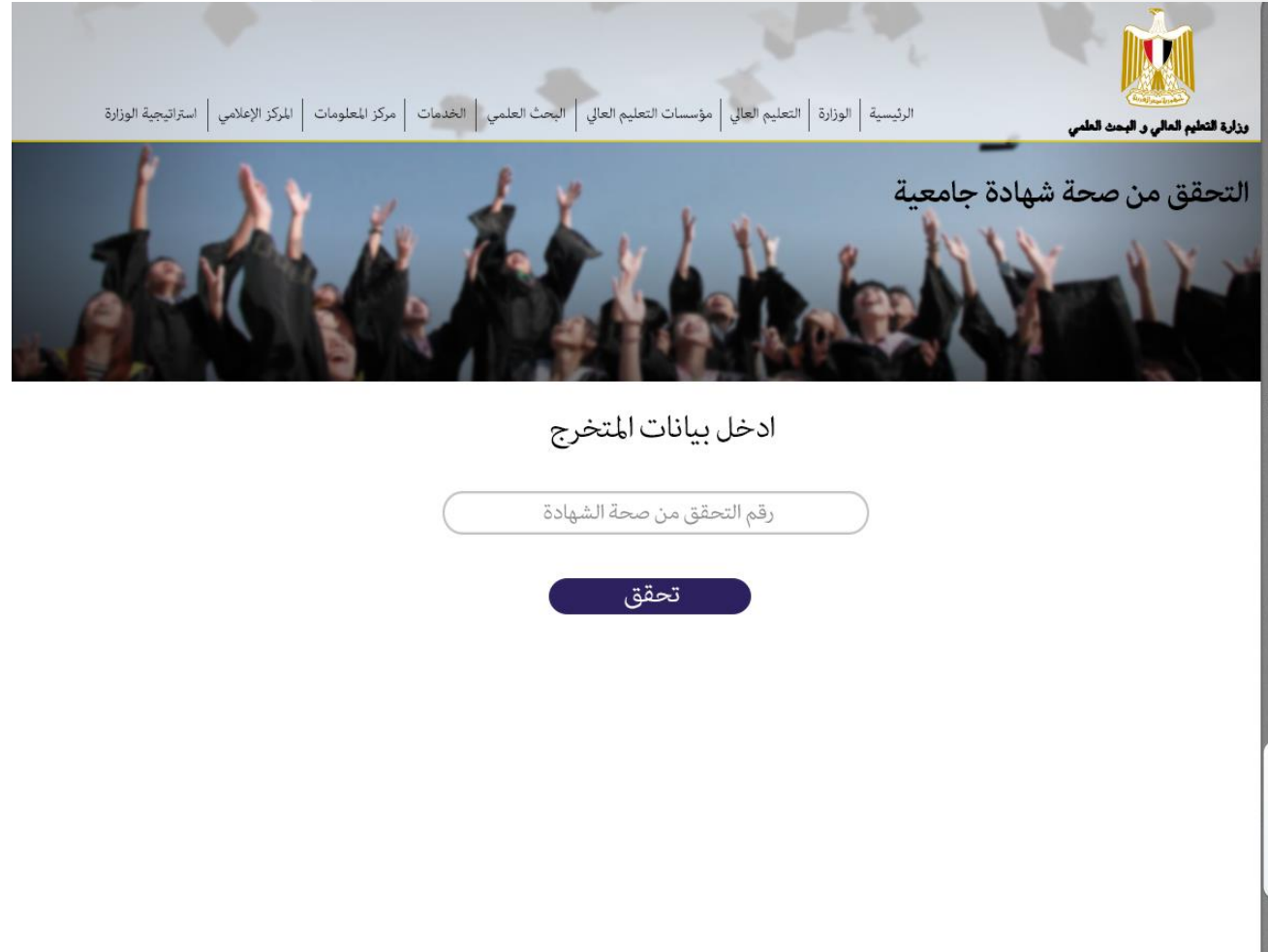


Figure 11: MOHESR webapp.

Web UI (2/3)


وزارة التعليم العالي والبحث العلمي | الرئيسة | الوزارة | التعليم العالي | مؤسسات التعليم العالي | البحث العلمي | الخدمات | مركز المعلومات | المركز الإعلامي | الاستراتيجية الوزارة

التحقق من صحة شهادة جامعية

ادخل بيانات المتخرج

رقم التحقق من صحة الشهادة

تحقق



جامعة مصر الدولية
شهادة
تتعد جامعة مصر الدولية
بأن - بسنت مصطفى كمال عبد المجيد الدري
المولود في القاهرة / مصر بتاريخ ١١ / ١٠ / ١٩٩٥
قد أنهى دراسته بنجاح وحصل على درجة البكالوريوس
في المعلومات والخاسبات تخصص علوم الحاسب
في دور يوليو عام ٢٠١٧ - بمعدل تراكمي ٣,٢٦ / تقدير عام جيد جداً
وتم اعتماد النتيجة بتاريخ ٣ / ٧ / ٢٠١٧
رئيس لجنة رصد الدرجات
عبد العزيز إبراهيم / سليمان شيبه
عميد الكلية

الاسم: بسنت مصطفى كمال عبد المجيد الدري
تاريخ الميلاد: ١٩٩٠/١٠/١١
تخصص البكالوريوس: علوم الحاسب
دور: يوليو ٢٠١٧
معدل تراكمي: ٣.٢٦
تقدير عام: جيد جداً
اعتماد النتيجة: ٢٠١٧/٧/٣
صالحة من ٢٠١٨/٣/٥ حتي ٢٠١٩/٣/٥

Web UI (3/3)

وزارة التعليم العالي و البحث العلمي

الرئيسية | الوزارة | التعليم العالي | مؤسسات التعليم العالي | البحث العلمي | الخدمات | مركز المعلومات | المركز الإعلامي | استراتيجية الوزارة

التحقق من صحة شهادة جامعية

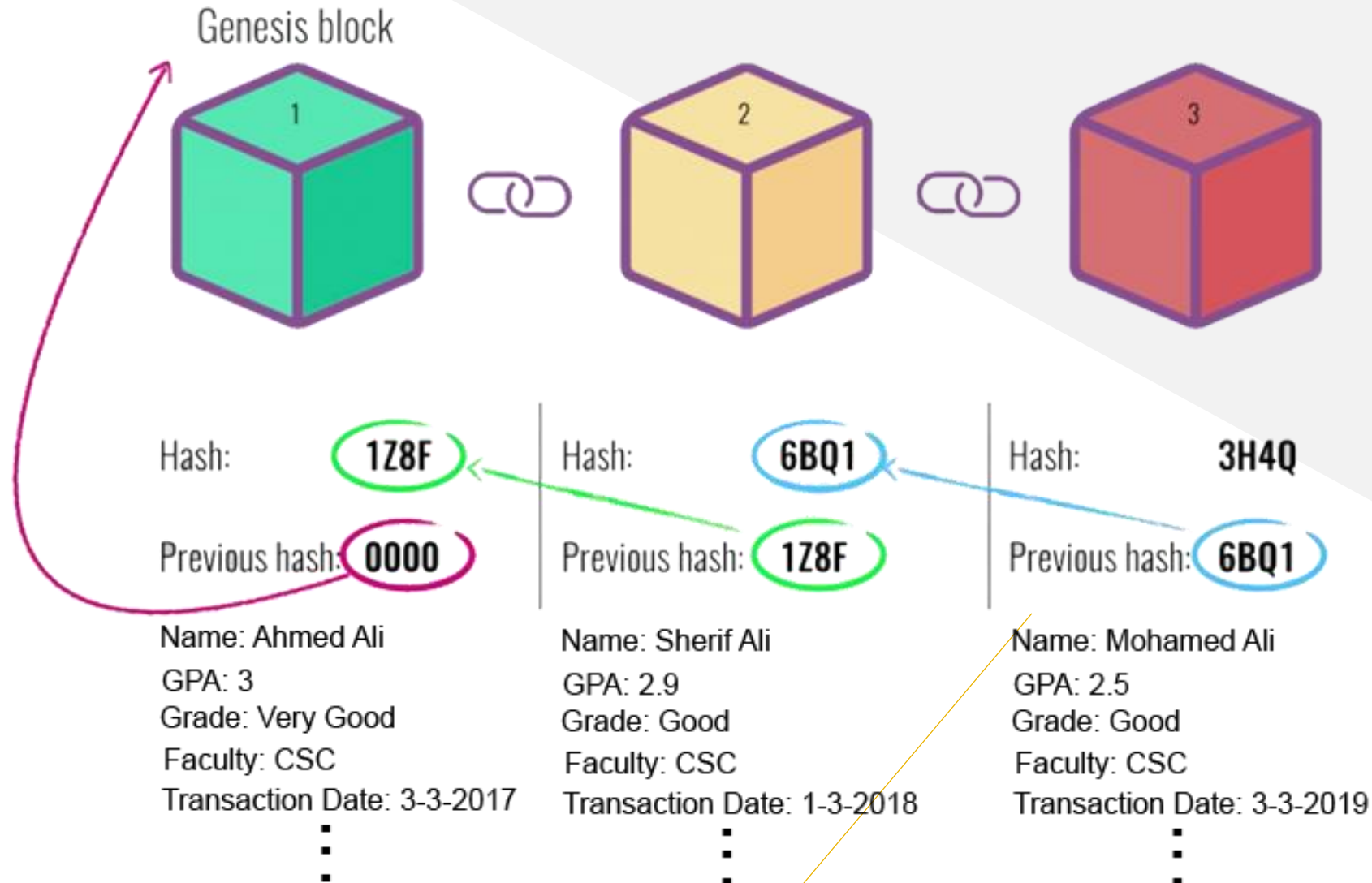
ادخل بيانات المتخرج

رقم التحقق من صحة الشهادة

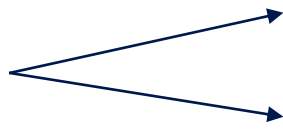
تحقق

عفوًا، هذه الشهادة غير مسجلة بوزارة التعليم العالي

Blockchain Representation



Hyperledger Fabric

- Node Types 
 - Peers
 - Orderers
- Identities
- Certificate Authority
- Channels
- Chaincode (Smart contract)

Network Topology

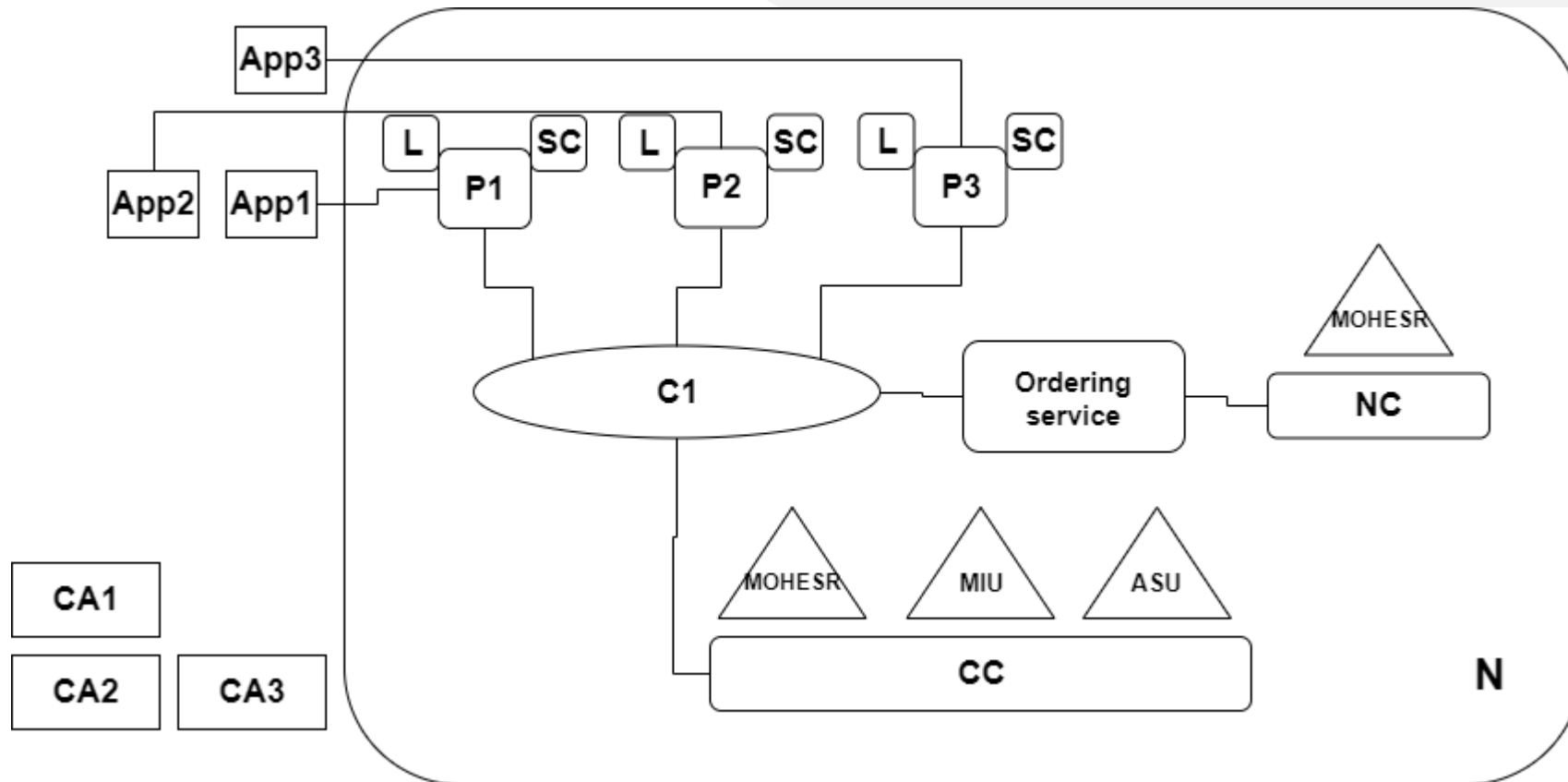
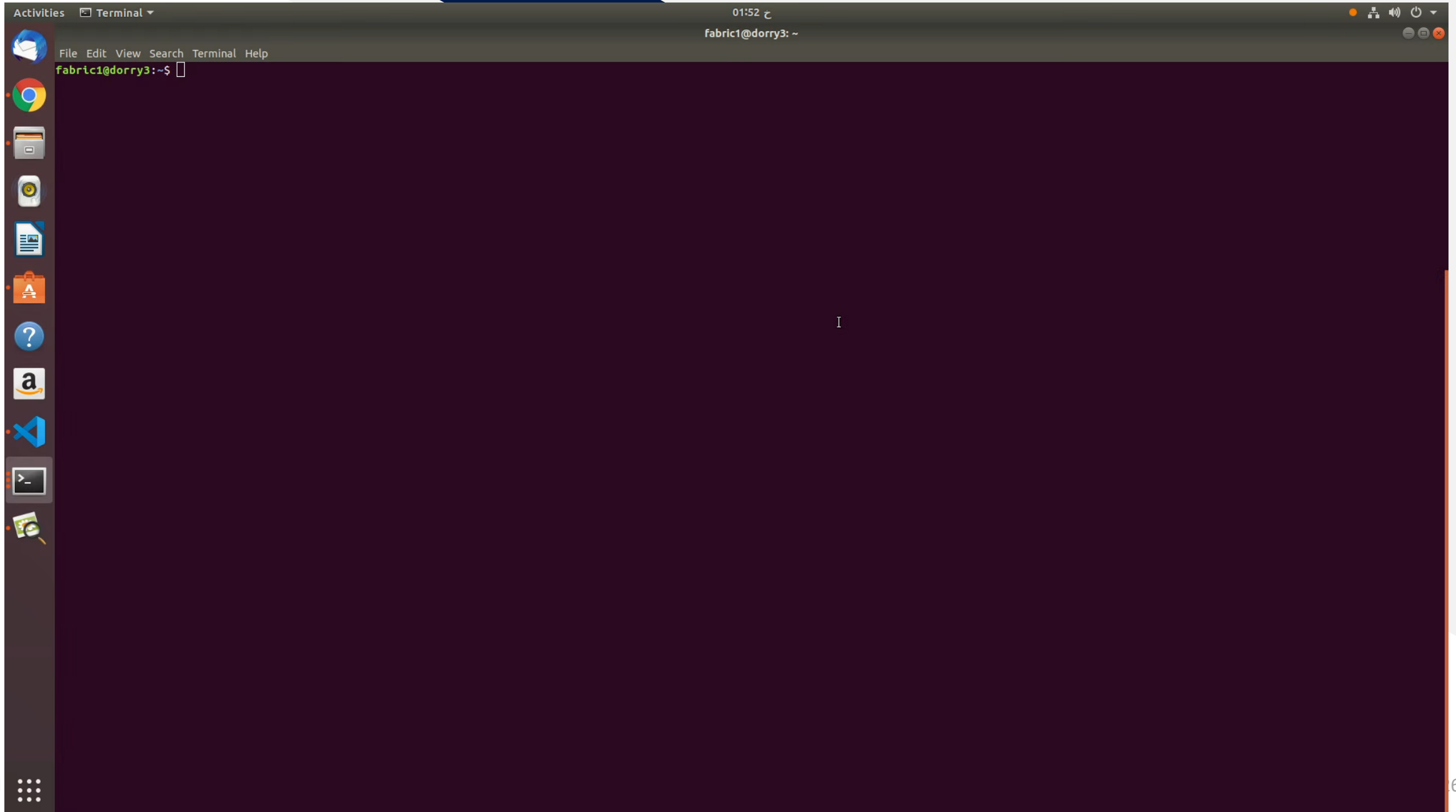


Figure 14: Network Topology.

Demo





**Any Questions?
Thank You**