# DIGITAL CERTIFICATE VERIFICATION SYSTEM

BLOCKCHAIN AND CRYPTOCURRENCY - CS577

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# OBJECTIVE!

- The requirement to quickly validate degree credentials creates new business prospects even as the number of universities, higher education students, and annual graduates rises steadily.
- Fake certificates are easily obtained in India. Businesses that hire thousands of new hires invest a lot of money on having applicants' transcripts and educational credentials validated.

This issue can be resolved with a digital certificate that uses blockchain technology.

# NEED OF BLOCKCHAIN

**Integrity and Transparency**

- Each certificate has a unique address on the blockchain and cannot be changed.

**Verification of Authenticity**

- Blockchain certificates are verified by a transaction containing the certificate's address.

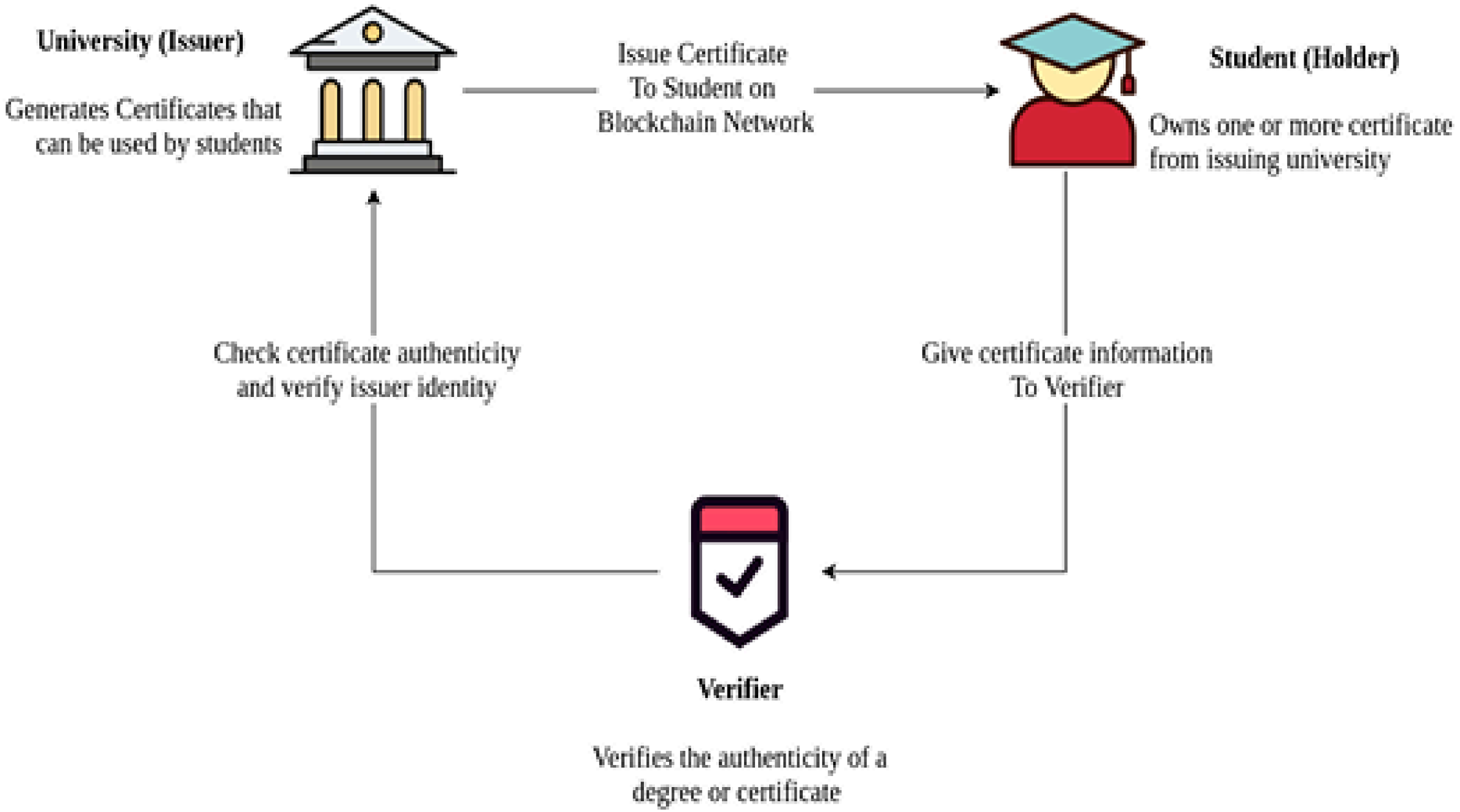
**Decentralization**

- Blockchain is a decentralized system where no central authority controls it.

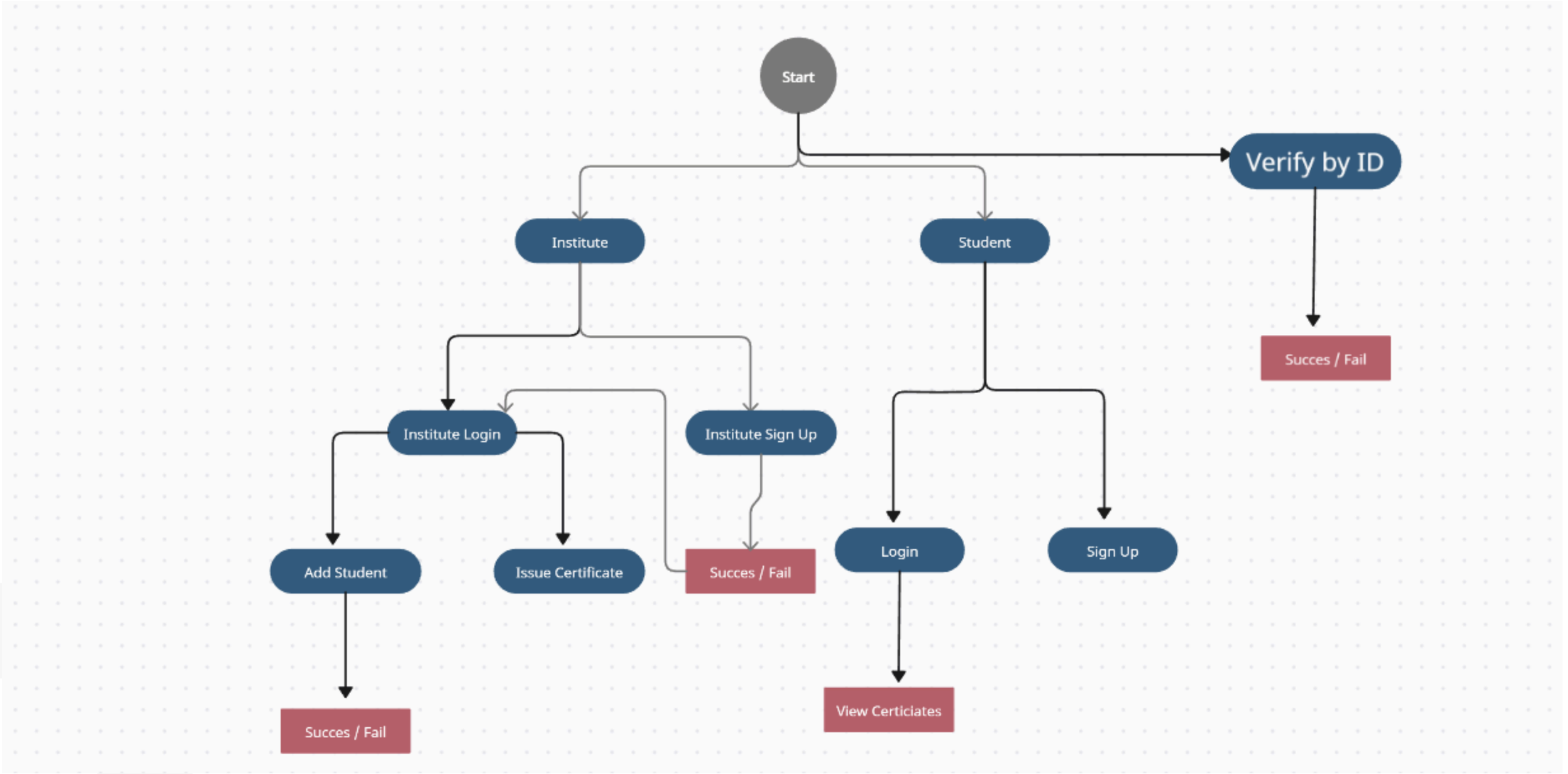
# ROLES AND FUNCTIONALITIES

- **Admin Role**:
  - Assigns Ethereum addresses to universities/institutes.
- **Institute Role**:
  - Creates courses and issues certificates.
  - Generate student account addresses.
- **Student Role**:
  - Retrieves and verifies certificates.
- **Verifier Role**:
  - Checks authenticity via blockchain.

# WORKFLOW


University (Issuer)
Generates Certificates that can be used by students
Issue Certificate To Student on Blockchain Network
Student (Holder)
Owns one or more certificate from issuing university
Check certificate authenticity and verify issuer identity
Give certificate information To Verifier
Verifier
Verifies the authenticity of a degree or certificate

# ACTIVITY DIAGRAM



# SMART CONTRACT OVERVIEW

## 1. Key Data Structures

- `struct Institute`:
  - Fields: `string name`, `string acr`, `string link`, `string[] course`
- `mapping institutes`:
  - Maps `address` → `Institute`
- **Additional Lists:**
  - `address[] InstAddressList`
  - `address[] StudAddressList`
  - `address[] certAddressList`

# SMART CONTRACT OVERVIEW

### 2. Functions for Institutes

- Add an Institute:
  - `function addInstitute(Institute)`
- View Details:
  - `function viewInstitute(address instAddress)`
  - `function getInstituteName(address instAddress)`
- View All Institutes:
  - `function viewAllInstitutes()`

### 3. Functions for Students

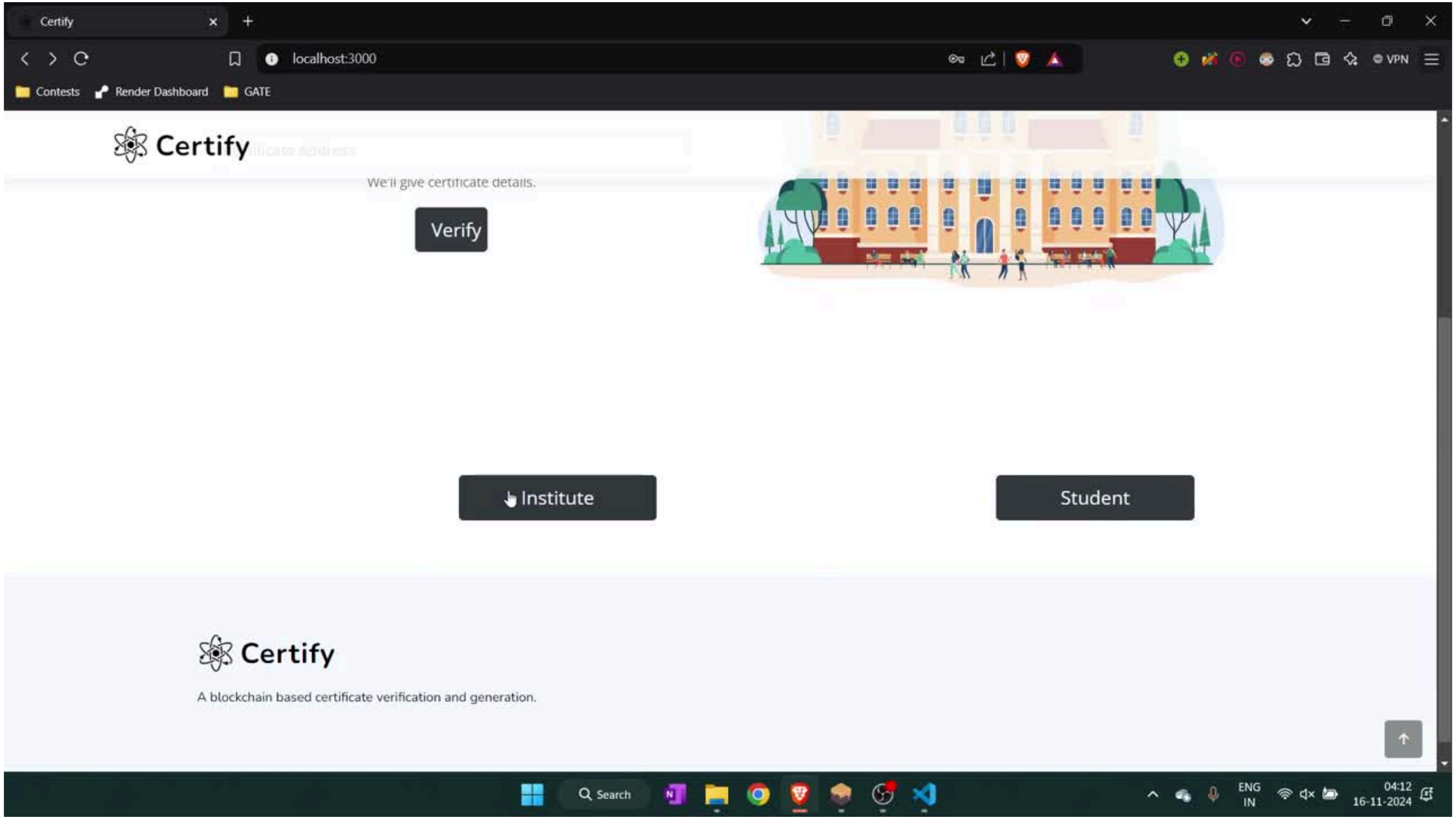
- Student Mapping:
  - `mapping students(address => string)` → Maps `address` → `name`
- Add a Student:
  - `function addStudent(address studAddress, string name)`
- Get Student Name:
  - `function getStudentName(address studAddress)`

# SMART CONTRACT OVERVIEW

### 4. Certificate Management

- `struct Certificate`:
  - Fields: `address certAddress`, `address studAddress`, `address instAddress`, `...`
- **Certificate Mapping:**
  - `mapping certificates(address => Certificate)`
- **Certificate Functions:**
  - **Issue Certificate:** `function issueCertificate(Certificate cert)`
  - **View Certificates:**
    - `function viewCertificate(address certAddress)`
    - `function viewStudCertificate(address studAddress)`

# DEMO


Certify
localhost:3000
Contests
Render Dashboard
GATE
VPN
Certify
We'll give certificate details.
Verify
Institute
Student
Certify
A blockchain based certificate verification and generation.
Search
ENG
IN
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# TECH STACK USED

- Smart Contract: Solidity for backend logic.
- Frontend and backend : EJS, Node.js , Express.js
- Blockchain: Ethereum network for decentralized storage.
- Database : MongoDB
- Tools  : VS Code , ganache , MongoDB Compass.
- Others :  truffle, web3, bcrypt.

Find instructions with code here : https://github.com/eshwar0210/Certify

# THANK YOU

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