Project Design Phase

Solution Architecture

DATE	OCTOBER 2023
TEAM ID	NM2023TMID01010
PROJECT NAME	Transparent Education Management System

SOLUTION ARCHITECTURE:

1.Blockchain Selection:

Choose an appropriate blockchain platform like Ethereum, Hyperledger, or any other that supports smart contracts and is scalable for educational data management.

2. Smart Contract Development:

Develop a smart contract on the chosen blockchain platform to manage the digital certificates. The smart contract should include functions to add new certificates and query certificate details. It should also handle permissions and validation logic.

3. Decentralized Application (DApp):

Create a user-friendly decentralized application (DApp) for students, educational institutions, and potential employers to interact with the blockchain. The DApp should have interfaces to submit new certificates and verify existing ones.

4. Certificate Issuance Process:

When a student completes a course or degree, the educational institution issues a digital certificate.

The institution submits the certificate details to the blockchain through the DApp.

The smart contract validates the data and adds the certificate to the blockchain ledger.

5. Querying Certificate Details:

Individuals or organizations can query certificate details by entering specific information like student ID or certificate number into the DApp.

The DApp sends a query request to the smart contract on the blockchain.

The smart contract retrieves the relevant certificate data and returns it to the DApp for display.

6. Immutability and Security:

Once added to the blockchain, certificate data becomes immutable, ensuring that it cannot be altered or tampered with.

Use cryptographic techniques to secure data transmission between the DApp and the blockchain network.

7. Consensus Mechanism:

Choose an appropriate consensus mechanism (Proof of Work, Proof of Stake, etc.) based on the blockchain platform to validate and agree upon the transactions.

8. Nodes and Network Setup:

Set up a network of nodes to maintain the decentralized nature of the blockchain.

Nodes can be operated by educational institutions, employers, and other stakeholders to ensure the network's integrity.

9. User Authentication and Authorization:

Implement a secure authentication system for users accessing the DApp. Use public-private key cryptography or other secure authentication methods.

Define roles and permissions within the smart contract to control who can add new certificates and query existing ones.

10. Monitoring and Maintenance:

Implement monitoring tools to track the performance and health of the blockchain network.

Regularly update and maintain the smart contract and DApp to ensure compatibility with the evolving blockchain technology.

SOLUTION ARCHITECTURE DIAGRAM: