Assignment 1

Implementing a Simple Blockchain

Objective: Gain practical experience in coding a basic blockchain.

Instructions:

Language: You are free to choose any programming language.
Documentation: Include inline comments and a brief documentation explaining the functions and the proof-of-work mechanism.
Submission: Submit the code along with a document detailing the analysis performed.

Task:

- Define a Basic Block Structure:
- Create a block structure with attributes: index, timestamp, data, previous hash, and nonce.
- Implement Hashing Function:
- Write a function to calculate the hash of a block using a simple hashing algorithm (e.g., SHA-256).
- Create Block Addition Function:
- Develop a function to add new blocks to the blockchain. Ensure the correct linkage to the previous block.

Bonus Task: Integrate Proof-of-Work Mechanism:

- Extend the blockchain to incorporate a proof-of-work mechanism.
- Define the difficulty level for mining a new block. Adjust the difficulty parameter based on the desired mining time.

Analysis:

- Test scenarios such as adding blocks, checking hash validity, and ensuring the integrity of the blockchain.
- Attempt to tamper with a block in the blockchain (alter data or hash) and observe the effects.
- Verify that the proof-of-work mechanism detects and prevents tampering.