**Lesson Plan – Adding Blocks to the Chain Securely**

**Learning objectives -**

1. **Revise concepts of Nonce and Proof of Work from previous class**
2. **Implementing Proof Of Work**

**Materials required -**

**repl.it login credentials**

**Let’s Review some key term that we have learnt so far**

Congratulations! You learned about how transactions work in the blockchain and some of the mechanisms that keep a blockchain valid and secure.

Let’s review the key terms:

* **Transaction:** An exchange of value among participants on the blockchain network.
* **Participants:** Individuals accessing the blockchain network through computers to exchange value.
* **Unconfirmed:** Blocks and transactions that are yet to be verified.
* **Consensus:** The process of agreeing to the transactions on the blockchain network.
* **Hashing:** Generating a random string of characters from a given input.
* **Immutable:** Something whose records can’t be changed.
* **Recalculating Hashes:** Replacing the incorrect hash with a “correct” one to validate the chain.
* **Proof-of-Work:** A security feature in blockchain to prevent attackers from easily taking over the blockchain.
* **Trustless:** A feature of blockchain that states how the system doesn’t rely on any participant to verify transactions.
* **Longest Chain:** The most trusted chain with the largest amount of computational work done in calculating the Proof-of-Work.
* **Chainwork:**  It is a measure of the amount of computational power that has been used to validate and confirm transactions on the blockchain.

What is the key takeaway from all this? A block gets increasingly more tamper-proof as newer blocks are added next to it. Proof-of-Work makes it hard to get through the entire blockchain and allow someone to introduce a fake transaction.

The longest chain in a blockchain network is the one that has been verified and accepted by the majority of nodes in the network. Because each node in the network has a copy of the blockchain, it is extremely difficult for a hacker to alter the longest chain without being detected by the rest of the network. As a result, the longest chain in a blockchain network is generally considered the most secure and the most difficult to hack.

**Blockchain Summary**

Congratulations! You have completed all the steps required to build a basic blockchain! In this exercise, we will bring the key parts together to review what we have built so far.

1. A blockchain is a decentralized, distributed ledger that records transactions in a secure and tamper-proof manner. It was originally developed as the underlying technology for the cryptocurrency Bitcoin, but has since been adapted for a wide range of other applications.
2. At its core, a blockchain is a continuously growing chain of blocks that contains a record of all the transactions that have taken place on the network. Each block contains a set of transactions and a cryptographic hash of the previous block in the chain. This creates a secure, tamper-proof ledger that is resistant to manipulation.
3. One of the key features of a blockchain is its decentralized nature. Unlike traditional financial systems that rely on central authorities to validate transactions, a blockchain is maintained by a distributed network of nodes that work together to ensure the integrity of the ledger.
4. In addition to its use in cryptocurrency, blockchain technology has many other potential applications. These include supply chain management, identity verification, voting systems, and more.
5. While blockchain technology offers many benefits, it is not without its challenges. Some of the key issues facing blockchain adoption include scalability, interoperability, and regulatory concerns. Despite these challenges, the potential benefits of blockchain technology are significant, and it is likely to continue to play an important role in the development of many industries in the years to come.

\**Note: \** The blockchain we have built only exists on a local machine. It is important to know that actual blockchain applications operate on multiple computers in a decentralized manner.

Introducing the lesson/project including the concepts (Time - 45 min)

Link to Repl it Project :

https://replit.com/@PriyankaJetLea1/Lesson11AddingBlocksTotheChainSecurely#main.py

**Homework –**

# Write a program to find the sum of all items in a dictionary

<https://www.geeksforgeeks.org/python-program-to-find-the-sum-of-all-items-in-a-dictionary/>

Write a program to

* [Get Current Timestamp](https://pynative.com/python-timestamp/#h-get-current-timestamp) using
  + [Datetime to Timestamp](https://pynative.com/python-timestamp/#h-datetime-to-timestamp)
  + [Get Timestamp Using time Module](https://pynative.com/python-timestamp/#h-get-timestamp-using-time-module)
  + [Get Timestamp Using calendar Module](https://pynative.com/python-timestamp/#h-get-timestamp-using-calendar-module)

Also convert timestamp to string and datetime (format)

https://pynative.com/python-timestamp/