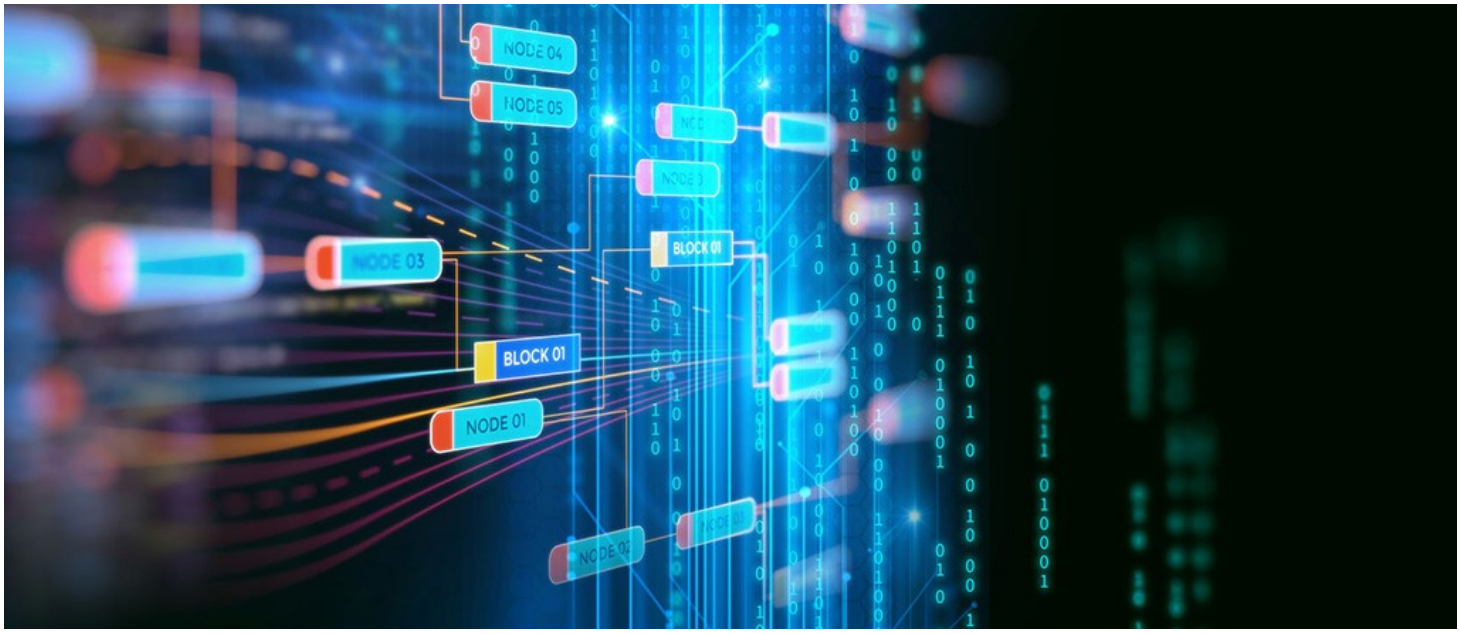
Blockchain Implementation in Python

This is just but a simple demonstration of a blockchain implemented in Python. The purpose of this demonstration is to show how blockchain works and how transactions are added to blocks and mined.



Prerequisites

- Python 3 installed on your machine.

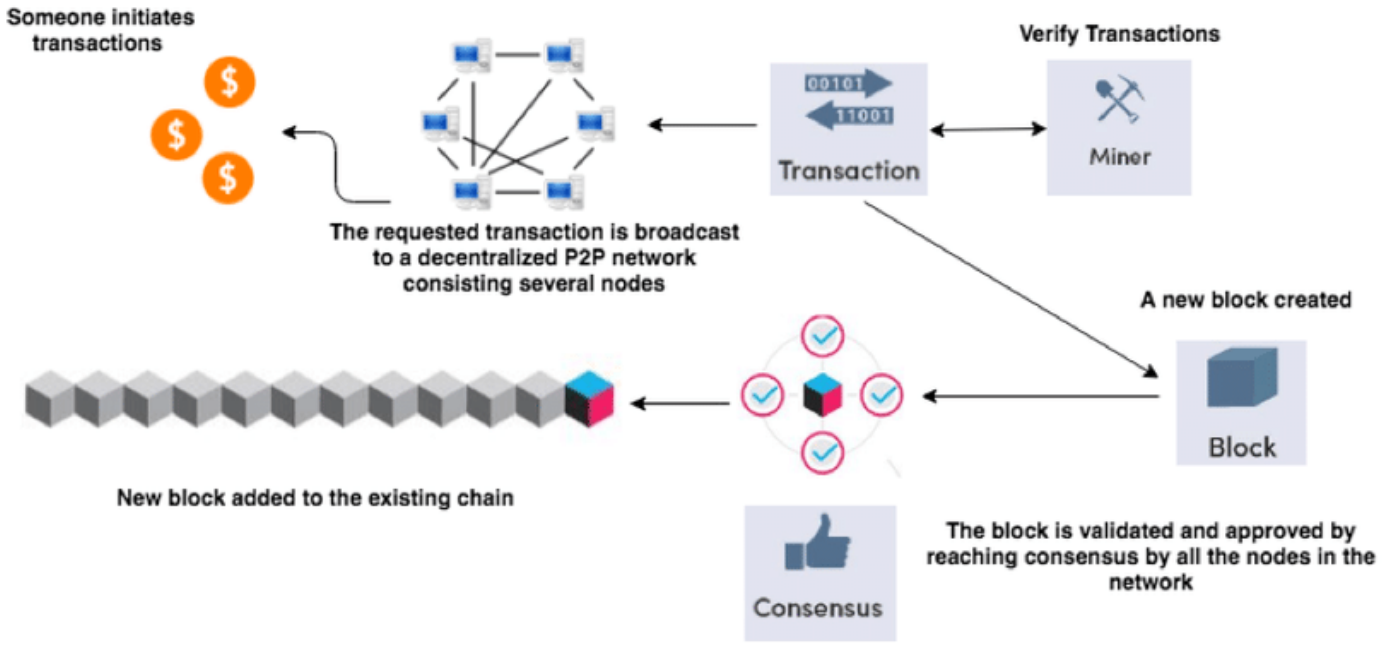
Running the Code

1. Clone this repository to your local machine.

```
git clone https://github.com/stevemats/DLT_Implementation.git
```

2. Navigate to the directory where the `blockchain.py` file is located.
3. Run the script by typing `python blockchain.py` in your terminal or command prompt.

Code Explanation



1. The `Blockchain` class represents a simple blockchain. It has methods for adding transactions, mining blocks, and creating new blocks.
2. The code includes a menu system with options to add transactions, view the blockchain, mine a block, save the blockchain to a file, load the blockchain from a file, and exit the program.
3. When you run the script, it creates a new `Blockchain` instance and enters a menu loop that prompts the user for input.
4. The user can add transactions, view the blockchain, mine a block, save the blockchain to a file, load the blockchain from a file, or exit the program by selecting the corresponding option from the menu.
5. If a valid proof of work is found, the new block is added to the blockchain, and the full blockchain is printed.
6. If a valid proof of work is not found within the maximum number of iterations, a message is printed indicating that the proof of work was not found.

Functionalities

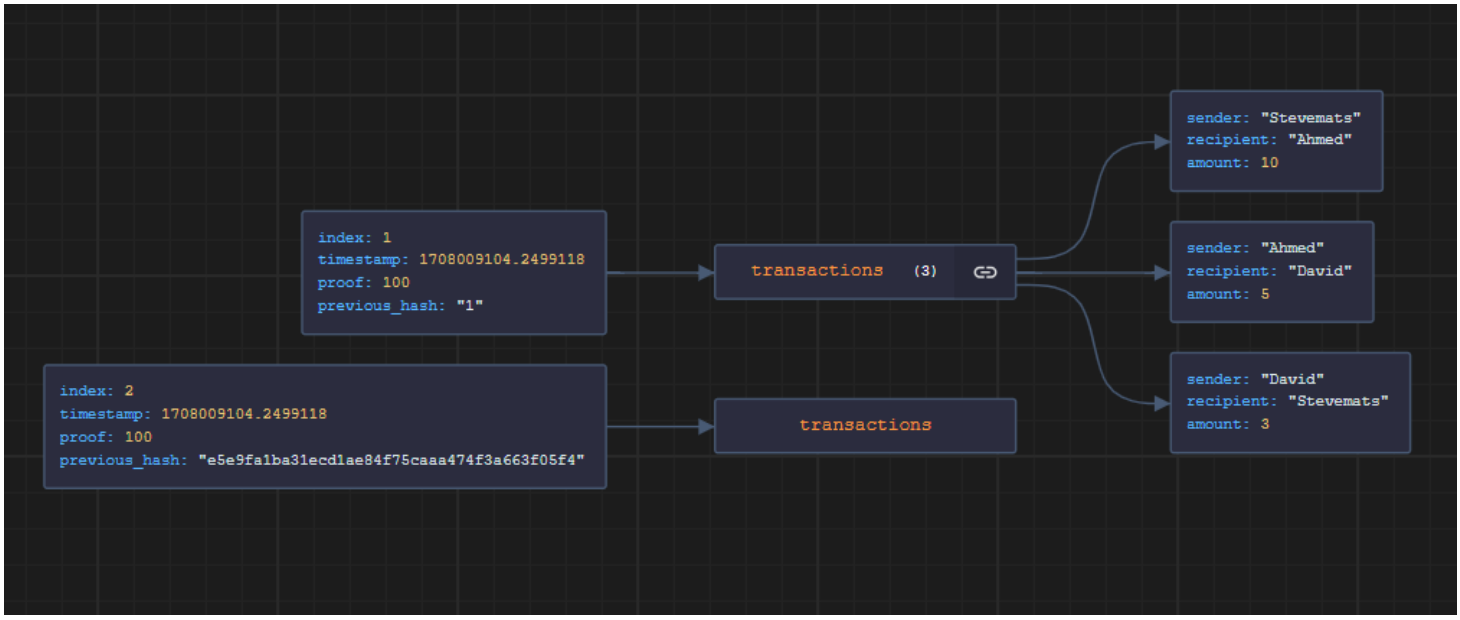
- **Add Transactions**: You can add transactions to the current block by selecting the `Add Transaction` option from the menu and providing the sender, recipient, and amount.
- **View Blockchain**: You can view the full blockchain by selecting the `View Blockchain` option from the menu.
- **Mine Blocks**: You can mine blocks by selecting the `Mine Block` option from the menu. The proof of work is a number that, when combined with the contents of the block, results in a hash with a

certain number of leading zeros.

- **Save Blockchain**: You can save the blockchain to a file by selecting the `Save Blockchain` option from the menu and providing a filename.
- **Load Blockchain**: You can load the blockchain from a file by selecting the `Load Blockchain` option from the menu and providing a filename.
- **Exit Program**: You can exit the program by selecting the `Exit` option from the menu.

Output

The output of the code is the full blockchain, including the initial block and the new block that was mined. If a valid proof of work is not found within the maximum number of iterations, the output will indicate that the proof of work was not found.



Note on Output

The output of the code only includes the genesis block (the initial block) because a valid proof of work was not found within the maximum number of iterations. To get the actual/better result output, you need to increase the number of iterations in the code. This will increase the likelihood of finding a valid proof of work and generating a more complete blockchain.

```
[
    {
        "index": 1,
        "timestamp": 1708009104.2499118,
        "transactions": [],
        "proof": 100,
        "previous_hash": "1"
    }
]
```


- Timestamp above is in unix format, you can convert it using the datetime module to make it human-readable if need be.

Also note that the current_transactions list is not persisted anywhere, so it will be reset whenever the program is restarted(I've implemented a JSON method only for demo), to solve this issue, use a better approach like e.g a DB or some sort of other form of persistent storage to store the blockchain and the transactions.