

# Python and Blockchain-Based Decentralized Voting System

## Overview

This Python command line program provides a decentralized voting system on the basis of blockchain principles. Each vote is a transaction and resides in an immutable blockchain data structure, ensuring the integrity of votes, transparency, and resistance to tampering in the absence of any centralized authority. This program should be run locally with no network link and thus it is very easy to test and understand.

## Objective

The purpose of the project is to demonstrate the ability to create secure and open voting mechanisms using blockchain technology. With the use of basic principles such as block hashing, proof-of-work, and chain validation, the project demonstrates the potential of trustless digital voting in a simplified context.

## Technologies Used

Python 3

Standard library

Hashlib for SHA-256 hashing

time for timestamps

JSON for block serialization

## System Architecture

The system consists of two major components:

**Block:** A single block in the blockchain. A block contains an index, timestamp, list of votes, proof-of-work nonce, previous block hash, and its hash.

**Blockchain:** Maintains the chain of blocks, validates blocks, handles proof-of-work, and prevents double voting by utilizing a set to maintain a record of voter IDs.

Votes are held temporarily until they are mined into a block. Mining occurs by performing a hash-based proof-of-work where the resulting hash should begin with two zeroes.

## **Key Features**

Casting a ballot via a voter ID and a candidate preference

Tracking voter IDs to prevent double voting

Unalterable blockchain history of every vote

Proof-of-work algorithm in block validation

Basic command line interface for user interaction