**Assignment: Exploring MultiChain Commands and Their Attributes**

**Objective: The purpose of this assignment is to familiarize students with MultiChain blockchain commands, specifically creating a chain, interacting with wallet transactions, creating and managing assets, and understanding the attributes retrieved by each command.**

**Task 1: Creating a MultiChain Instance**

**Command:**

**multichain-util create chain1**

**Instructions:**

1. **Run the command to create a new blockchain named chain1.**
2. **Note the configuration files generated in the .multichain directory.**
3. **Identify key attributes such as protocol-version, chain name, and default parameters.**
4. **Explain how these attributes define blockchain behavior.**

**Expected Attributes:**

* **chain-name: The name assigned to the blockchain.**
* **protocol-version: Specifies the MultiChain protocol version.**
* **network-port: The port assigned for network communication.**
* **rpc-port: The port for Remote Procedure Calls (RPCs).**
* **consensus mechanism: Defines whether the chain is permissioned or open.**

**Task 2: Listing Wallet Transactions**

**Command:**

**multichain-cli chain1 listwallettransactions**

**Instructions:**

1. **Start the newly created chain using:**

**multichaind chain1 -daemon**

1. **Run the command and analyze the output.**
2. **Identify and explain attributes retrieved by this command.**

**Expected Attributes:**

* **txid: Unique transaction ID.**
* **amount: Amount of asset transferred.**
* **confirmations: Number of confirmations for the transaction.**
* **blockhash: Hash of the block containing the transaction.**
* **timereceived: Timestamp when the transaction was received.**

**Task 3: Fetching Blockchain Parameters**

**Command:**

**multichain-cli chain1 getblockchainparams**

**Instructions:**

1. **Run the command and extract key attributes.**
2. **Describe the role of each parameter in blockchain operation.**

**Expected Attributes:**

* **chain-protocol: Indicates whether it's bitcoin or multichain.**
* **mining-diversity: Defines mining participation diversity.**
* **maximum-block-size: Determines the max size of each block.**
* **permission-model: Defines access control settings.**

**Task 4: Checking Peer Connections**

**Command:**

**multichain-cli chain1 getpeerinfo**

**Instructions:**

1. **Identify the number of connected peers in the network.**
2. **Explain key attributes related to peer connections.**

**Expected Attributes:**

* **id: Peer ID number.**
* **addr: IP address of the connected peer.**
* **subver: Version of MultiChain software used by the peer.**
* **pingtime: Latency between nodes.**

**Task 5: Creating and Managing Assets**

**Commands:**

**multichain-cli chain1 createasset asset1 1000 0.01**

**multichain-cli chain1 listassets**

**Instructions:**

1. **Create a new asset named asset1 with a total supply of 1000 and a smallest unit of 0.01.**
2. **Verify that the asset was created using listassets.**
3. **Identify key attributes related to asset creation and retrieval.**

**Expected Attributes:**

* **name: Name of the asset.**
* **issuetxid: Transaction ID of asset creation.**
* **quantity: Total supply of the asset.**
* **units: Smallest divisible unit of the asset.**

**Task 6: Fetching Raw Transactions**

**Command:**

**multichain-cli chain1 getrawtransaction "txid" 1**

**Instructions:**

1. **Retrieve raw transaction details for a given transaction ID.**
2. **Decode the raw transaction and explain its attributes.**

**Expected Attributes:**

* **hex: Raw transaction data in hexadecimal.**
* **blockhash: The block that includes this transaction.**
* **vin: Input details of the transaction.**
* **vout: Output details, including asset transfers.**

**Task 7: Generating a New Address**

**Command:**

**multichain-cli chain1 getnewaddress**

**Instructions:**

1. **Generate a new address in MultiChain.**
2. **Document the newly created address and analyze its structure.**

**Expected Attributes:**

* **address: The newly generated blockchain address.**
* **ismine: Indicates if the wallet owns this address.**
* **account: The account associated with this address.**

**Task 8: Listing All Addresses**

**Command:**

**multichain-cli chain1 listaddresses**

**Instructions:**

1. **List all addresses associated with the blockchain node.**
2. **Analyze the retrieved addresses and their attributes.**

**Expected Attributes:**

* **address: List of blockchain addresses.**
* **permissions: The permissions granted to each address.**
* **balance: The balance held in each address.**

**Task 9: Displaying Miners in MultiChain**

**Command:**

**multichain-cli chain1 listpermissions mine**

**Instructions:**

1. **List all addresses with mining permissions.**
2. **Analyze the role of each miner in the network.**

**Expected Attributes:**

* **address: List of miner addresses.**
* **permissions: Indicates mining capability.**
* **pending: If mining permissions are awaiting confirmation.**