

Getting started with Tezos **Client**

Library

Interacting with the node by **querying** its status or **asking** the node to perform some actions
A built-in wallet

To check the timestamp of the head of the chain (UTC)

```
$ ./tezos-client get timestamp
```

```
[ubuntu@ip-172-31-20-138:~$ tezos-client get timestamp
2019-05-31T10:04:27Z
[ubuntu@ip-172-31-20-138:~$ tezos-client get timestamp
2019-05-31T10:06:27Z
```

Snapshot mode

From the genesis to the head

Too long

Few days (SSD) or few weeks (HDD)

Checkpoint

A certain block whose previous blocks are regarded as immutable

Setting a checkpoint to the point where the chain's security is not compromised

Storing the data after the checkpoint dramatically cut the time of syncing

Make sure tezos-node is not running before run this command.

```
$ curl "https://gitlab.com/tezoskorea/tezos-snapshot/raw/master/quicksync.sh" | bash -s  
alphanet
```

Getting started with Tezos **Client**

Generate an Address

tezos-client has a **built-in wallet**

To generate a new address (a pair of keys)

```
$ ./tezos-client gen keys tezoskorea -s ed25519 --encrypted
```

```
[ubuntu@ip-172-31-18-57:~/tezos$ ./tezos-client gen keys myWallet --encrypted --force  
[Enter password to encrypt your key:  
[Confirm password:
```

Tezos supports 3 DSA schemes

ed25519 curve: tz1, recommended, there is a **verified library** (performance, security)

secp256k1 curve: tz2, the one used in Bitcoin and Ethereum, **HSM support**

secp256k1 curve: tz3, P-256, **HSM support**

Getting started with Tezos **Client**

Generate an Address

tezos-client has a **built-in wallet**

To generate a new address (a pair of keys)

```
$ ./tezos-client gen keys tezoskorea -s ed25519 --encrypted
```

```
[ubuntu@ip-172-31-18-57:~/tezos$ ./tezos-client gen keys myWallet --encrypted --force  
[Enter password to encrypt your key:  
[Confirm password:
```

Never forget your password.

tezoskorea is an alias for your addresses only used locally.

You can freely set an alias and use this alias to check the balance and transfer tokens.

```
$ ./tezos-client get balance for myWallet
```

```
ubuntu@ip-172-31-18-57:~/tezos$ tezos-client get balance for myWallet  
0 tζ
```

Getting started with Tezos **Client**

Key management

```
$ ./tezos-client list known addresses
```

```
[ubuntu@ip-172-31-28-211:~$ tezos-client list known addresses
john: tz1LsDttshWsAAPHZqJGYuSZfrkGMcSpZ25B (encrypted sk known)
kim: tz1M7sFiTqDffL5Nj4znQcXixcVwZEbW7Y1z (unencrypted sk known)
```

```
$ ./tezos-client show address tezoskorea --show-secret
```

```
ubuntu@ip-172-31-18-57:~/tezos$ tezos-client show address myWallet --show-secret
Hash: tz1PJzmWptPmpoNnTZ2exsTd7aEQfhtoGdvU
Public Key: edpkub5rGi59z3HxKqEbuUT7xk6PxCVGUDcEokPCLd9emQ5aw6BZuQ
Secret Key: encrypted:edesk1QKMCEyvQUYJSJzGf4RPeqCj9KHiQGgad4CzSr2eB4pcQvnKpcZwJv6TEGSyVUcPoJRD35vQE3H5Tepjp8r
```

The directory directory **~/.tezos-client** is filled with 3 files

public_key_hashes , **public_keys** and **secret_keys** .

```
[ubuntu@ip-172-31-18-57:~/tezos$ ls ~/.tezos-client/
public_key_hashes  public_keys  secret_keys
```

```
[ubuntu@ip-172-31-18-57:~/tezos$ cat ~/.tezos-client/secret_keys && echo
[ { "name": "myWallet",
  "value":
    "encrypted:edesk1QKMCEyvQUYJSJzGf4RPeqCj9KHiQGgad4CzSr2eB4pcQvnKpcZwJv6TEGSyVUcPoJRD35vQE3H5Tepjp8r" } ]
```

Free tez from faucet (ref #17)

faucet.tzalpha.net

alphanet only

Welcome to the Tezos Faucet

please drink responsibly

Get alphanet 



I'm not a robot



reCAPTCHA
Privacy - Terms

Free tez from faucet (ref #17)

faucet.tzalpha.net

alphanet only

```
$ ./tezos-client activate account faucet with tz1_____json
```

```
ubuntu@ip-172-31-18-57:~/tezos$ ./tezos-client activate account faucet with tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx.json
Node is bootstrapped, ready for injecting operations.
Operation successfully injected in the node.
Operation hash is 'ooRvmCbi7ztqU3bxX5G2185s5puXe2dkQ9os8qRkzEBdrAvUvkf'
Waiting for the operation to be included...
Operation found in block: BMC8ufZvFfcxtFt6K2WUjfWhhsUUdy7HFroCWqiepQLWhyNVtxR (pass: 2, offset: 0)
This sequence of operations was run:
  Genesis account activation:
    Account: tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx
  Balance updates:
    tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx ... +tz10113.895767

The operation has only been included 0 blocks ago.
We recommend to wait more.
Use command
  tezos-client wait for ooRvmCbi7ztqU3bxX5G2185s5puXe2dkQ9os8qRkzEBdrAvUvkf to be included --configurations 30 --branch BMT1wim2ef7cyXE8ZJ7XSdVDgb9dzK2h18J7QcBuwK5E9sn96XN
and/or an external block explorer.
Account faucet (tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx) activated with tz10113.895767.
```

Free tez from faucet (ref #17)

faucet.tzalpha.net

alphanet only

```
$ ./tezos-client list known addresses
```

```
[ubuntu@ip-172-31-18-57:~/tezos$ ./tezos-client list known addresses
faucet: tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx (unencrypted sk known)
myWallet: tz1PJzmWptPmpoNnTZ2exsTd7aEQfhtoGdvU (encrypted sk known)
```

```
$ ./tezos-client get balance for faucet
```

```
[ubuntu@ip-172-31-18-57:~/tezos$ ./tezos-client get balance for faucet
10113.895767 tζ
```

Injecting a transaction

Transactions

transfer command returns a receipt with all the information of the transaction

tezos-client then waits for the operation to be included in one block

30 blocks or more is recommended

tezos-node can validate an operation before injecting it to the network (**--dry-run**)

Gas and storage limits can be determined by this validation

```
$ ./tezos-client transfer 1 from tezoskorea to john --force-low-fee
```

```
$ ./tezos-client wait for OPHASH to be included --confirmations 30
```

Injecting a transaction

Transactions **at first**

```
$ ./tezos-client transfer 1 from myWallet to john --force-low-fee --dry-run
```

```
[ubuntu@ip-172-31-28-211:~$ tezos-client transfer 1 from myWallet to john ]  
--force-low-fee --dry-run  
Node is bootstrapped, ready for injecting operations.
```

Fatal error:

The operation will burn `t30.257` which is higher than the configured burn cap (`t30`).

Use `--burn-cap 0.257` to emit this operation.

Nobody in the network knows **the public key of tezoskorea**

A **reveal** operation is an operation that writes on the chain the public key associated with a public key hash for an implicit account.

Injecting a transaction

Transactions receipt

```
ubuntu@ip-172-31-18-57:~/tezos$ ./tezos-client transfer 10112 from faucet to myWallet --burn-cap 0.257 --force-low-fee
Node is bootstrapped, ready for injecting operations.
Estimated gas: 10200 units (will add 100 for safety)
Estimated storage: 257 bytes added (will add 20 for safety)
Operation successfully injected in the node.
Operation hash is 'ooHS29Bu1hazmbqYRcfKT4HjxD5ywcwow8JY7q5ugWMGXqoLBrb'
Waiting for the operation to be included...
Operation found in block: BLzrTp8UjPNsEc6coig4W2YLamKWrqEsbc6imKWaKiGWW4gTg5 (pass: 3, offset: 6)
This sequence of operations was run:
  Manager signed operations:
    From: tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx
    Fee to the baker: t50.00126
    Expected counter: 176192
    Gas limit: 10000
    Storage limit: 0 bytes
    Balance updates:
      tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx ..... -t50.00126
      fees(tz3gN8NTLNLJg5KRsUU47NHNVHbdhcFXjjab, 256) ... +t50.00126
    Revelation of manager public key:
      Contract: tz1duCT9DkNUiYnDY1yKmPTxp6C15QFBW5fx
      Key: edpkuv35rRDMrnMnSHPauLTe61XMsRBXe4b4xrr4opjgTiBppzB6Qk
```

RPC API (ref #18)

Usage

`./tezos-node run--rpc-addr <ADDR:PORT>`

(Default port is 8732)

`./tezos-client rpc get list`

`./tezos-client rpc get <URL>`

`./tezos-client rpc post <URL> with <JSON>`

```
[ubuntu@ip-172-31-23-117:~/tezos$ ./tezos-client rpc list

Available services:

+ chains/<chain_id>/
  - GET /chains/<chain_id>/blocks
    Lists known heads of the blockchain sorted with decreasing fitness.
    Optional arguments allows to returns the list of predecessors for
    known heads or the list of predecessors for a given list of blocks.
  - /chains/<chain_id>/blocks/<block_id> <dynamic>
  - GET /chains/<chain_id>/chain_id
    The chain unique identifier.
  - GET /chains/<chain_id>/checkpoint
    The current checkpoint for this chain.
  - GET /chains/<chain_id>/invalid_blocks
    Lists blocks that have been declared invalid along with the errors
    that led to them being declared invalid.
  - GET /chains/<chain_id>/invalid_blocks/<block_hash>
    The errors that appears during the block (in)validation.
  - DELETE /chains/<chain_id>/invalid_blocks/<block_hash>
    Remove an invalid block for the tezos storage
  - /chains/<chain_id>/mempool <dynamic>
  - GET /errors
    Schema for all the RPC errors from the shell
  - GET /fetch_protocol/<Protocol_hash>
    Fetch a protocol from the network.
+ injection/
  - POST /injection/block
    Inject a block in the node and broadcast it. The `operations` embedded in `blockHeader` might be pre-validated using a contextual RPCs from the latest block (e.g. '/blocks/head/context/preapply'). Returns the ID of the block. By default, the RPC will wait for the block to be validated before answering.
  - POST /injection/operation
    Inject an operation in node and broadcast it. Returns the ID of the operation. The `signedOperationContents` should be constructed using a contextual RPCs from the latest block and signed by the client. By default, the RPC will wait for the operation to be (pre-)validated before answering. See RPCs under /blocks/prevalidation for more details on the prevalidation context.
```

RPC API (ref #18)

Retrieve constants

```
$ ./tezos-client rpc get /chains/main/blocks/head/context/constants | jq
```

```
[ubuntu@ip-172-31-23-117:~/tezos$ ./tezos-client rpc get /chains/main/blocks/head/context/constants | jq
{
  "proof_of_work_nonce_size": 8,
  "nonce_length": 32,
  "max_revelations_per_block": 32,
  "max_operation_data_length": 16384,
  "max_proposals_per_delegate": 20,
  "preserved_cycles": 3,
  "blocks_per_cycle": 2048,
  "blocks_per_commitment": 32,
  "blocks_per_roll_snapshot": 256,
  "blocks_per_voting_period": 8192,
  "time_between_blocks": [
    "30",
    "40"
  ],
  "endorsers_per_block": 32,
  "hard_gas_limit_per_operation": "400000",
  "hard_gas_limit_per_block": "4000000",
  "proof_of_work_threshold": "70368744177663",
  "tokens_per_roll": "10000000000",
  "michelson_maximum_type_size": 1000,
  "seed_nonce_revelation_tip": "125000",
  "origination_size": 257,
  "block_security_deposit": "512000000",
  "endorsement_security_deposit": "64000000",
  "block_reward": "16000000",
  "endorsement_reward": "2000000",
  "cost_per_byte": "1000",
  "hard_storage_limit_per_operation": "60000"
}
```

RPC API (ref #18)

Retrieve a block

```
$ ./tezos-client rpc get /chains/main/blocks/<head | hash | level>
```

```
[ubuntu@ip-172-31-23-117:~/tezos$ ./tezos-client rpc get /chains/main/blocks/head | jq
{
  "protocol": "PsddFKi32cMJ2qPjf43Qv5GDWLDPZb3T3bF6fLKiF5HtvHNU7aP",
  "chain_id": "NetXgtSLGNJvNye",
  "hash": "BLW8dwpYrVmgT2yX1n9R5PsJ2qEzpEQsvFoKbCDFpKiixX2sywh",
  "header": {
    "level": 38208,
    "proto": 1,
    "predecessor": "BL2o2N7W2K7VH8zn2XXCn4aaNXk2dMqZvvH8xTRdTK5P7skrNUo",
    "timestamp": "2018-12-17T16:11:48Z",
    "validation_pass": 4,
    "operations_hash": "LLoZtoSQu4M7dWAVHWYvNXzvcRxMkTi1qh91EmspVK3chJ18j6KQ",
    "fitness": [
      "00",
      "00000000010f093"
    ],
    "context": "CoW3CLeMriNtEvn6vBUv993RKbYKN1WStPd7XaumWVamujCrTiS",
    "priority": 0,
    "proof_of_work_nonce": "000000038ceee095",
    "seed_nonce_hash": "nceUnn2PpKfwE8RTw1siMWWhW7h42Qv3ymK4npQXjcD857KXn4o2",
    "signature": "sigaiWaMAciJPfh2mSFCHbbsz6K9cxHi8EqAbHSy3favYPv1WaVKx97skTFgFHDDZV8mdst
1ntPYAoJU15dgTgpq4K6CkU5y"
  }
}
```

RPC API before the checkpoint (ref #18)

Public Node1 - tezTech

```
$ curl https://mainnet.tezrpc.me/chains/main/blocks/20 | jq
```

```
choemincheols-MacBook-Pro:tezos mcwithimp$ curl https://mainnet.tezrpc.me/chains/main/blocks/541889/operations/1 | jq
% Total    % Received % Xferd  Average Speed   Time     Time      Time  Current
                                         Dload  Upload   Total   Spent    Left  Speed
100  509     0  509     0       0    884      0 --:--:-- --:--:-- --:--:--   883
[
  {
    "protocol": "Pt24m4xiPbLDhVgVfABUjirbmda3yohdN82Sp9FeuAXJ4eV9otd",
    "chain_id": "NetXdQprcVkpawU",
    "hash": "ooPk8beQUTNztpSb46hH3ta6wJw8Akbx99GhpMDfMEfgpCf9QoF",
    "branch": "BLR6qfNRMQeux8tdrYWu674zKs7Kheyd5zb1rSBWFzZGty8x89B",
    "contents": [
      {
        "kind": "proposals",
        "source": "tz1PPUo28B8BroqmVCMMNDudG4ShA2bzicrU",
        "period": 16,
        "proposals": [
          "PsBABY5nk4JhdEv1N1pZbt6m6ccB9BfNqa23iKZcHBh23jmRS9f"
        ],
        "metadata": {}
      },
      {
        "signature": "sigu9LLGFPb23svgC1VaVKFMEPAQ1Nk4RBuDZjQXZt1qLVteF6qqTJHscZktW8PTruzmHzTkTjFdLg6FV8HTLq7Q1rW3FHNi"
      }
    ]
  }
```

RPC API before the checkpoint (ref #18)

Public Node2 - tzscan

```
$ ./tezos-client -A mainnet-node.tzscan.io -P 443 -S rpc get /chains/main/blocks/20
```

```
[choemincheols-MacBook-Pro:tezos mcwithimp$ tezos-client -A mainnet-node.tzscan.io -P 443 -S rpc get /chains/main/blocks/541889/operations/1
[ { "protocol": "Pt24m4xiPbLDhVgVfABUjirbmda3yohdN82Sp9FeuAXJ4eV9otd",
  "chain_id": "NetXdQprcvkpawU",
  "hash": "ooPk8beQUTNztpSb46hH3ta6wJw8Akbx99GhpMDfMEfgpCf9QoF",
  "branch": "BLR6qfNRMQeux8tdrYwu674zKs7Kheyd5zb1rSBWFzzGty8x89B",
  "contents":
    [ { "kind": "proposals",
      "source": "tz1PPUo28B8BroqmVCMMNDudG4ShA2bzicrU", "period": 16,
      "proposals":
        [ "PsBABY5nk4JhdEv1N1pZbt6m6ccB9BfNqa23iKZcHBh23jmRS9f" ],
      "metadata": {} },
     {
       "signature": "sigu9LLGFPb23svgC1VaVKFMEPAQ1Nk4RBuDZjQXZt1qLVteF6qqTJHscZktW8PTruzmHzTkTjFdLg6FV8HTLq7Q1rW3FHNi" } ]
```

Block structure

A Block

consists of **protocol**, **chain_id**, **hash**, **header**, **metadata** and **operations**.

```
1  {
2    "protocol": "Pt24m4xiPbLDhVgVfABUjirbmida3yohdN82Sp9FeuAXJ4eV9otd",
3    "chain_id": "NetXdQprcVkpawU",
4    "hash": "BM45PLkPkvSmh7L5XgyrRBYjHvjYWk1icpqoh2S5aYuoyAkz5AN",
5    "header": { },
21   "metadata": { },
84   "operations": [ ]
1056 }
```

The **header** contains **height**, **previous hash**, **merkle root** and etc.

```
5   "header": {
6     "level": 503443,
7     "proto": 4,
8     "predecessor": "BKpumgUMxfMTwf8kRxNKAChGWU4FcZv188cnDZmHEqkzJHHZyW",
9     "timestamp": "2019-07-01T12:58:28Z",
10    "validation_pass": 4,
11    "operations_hash": "LLoZVdpbcmXK6w8wfhJnadHWKvhCfrjFeWSQRs9p1FhJUHbTU2mgG",
12    "fitness": [
13      "00",
14      "000000000f16761"
15    ],
16    "context": "CoWD4rgFcjnZzvL1ZDmT8Z7a9JvstSJMyTriHMGzuMddPaChC51y",
17    "priority": 0,
18    "proof_of_work_nonce": "000000035756c153",
19    "signature": "sigvJLV275L1hH1Rup49URnYj464TeeTnGunirbcVkjriyvfgNNqcyey2pJYvXBfjQ7cwMBbUZYroXvzbGfPGyzXNLZ6kTtm"
20  },
```

Block structure

A Block

consists of **protocol**, **chain_id**, **hash**, **header**, **metadata** and **operations**.

```
1  {
2    "protocol": "Pt24m4xiPbLDhVgVfABUjirbmida3yohdN82Sp9FeuAXJ4eV9otd",
3    "chain_id": "NetXdQprcVkpawU",
4    "hash": "BM45PLkPkvSmh7L5XgyrRBYjHvjYWk1icpqoh2S5aYuoyAkz5AN",
5    "header": { },
21   "metadata": { },
84   "operations": []
1056 }
```

The **metadata** contains **baker**, **baking reward** and etc.

```
"metadata": {
    "protocol": "Pt24m4xiPbLDhVgVfABUjirbmida3yohdN82Sp9Feu",
    "next_protocol": "Pt24m4xiPbLDhVgVfABUjirbmida3yohdN82S",
    "test_chain_status": { },
    "max_operations_ttl": 60,
    "max_operation_data_length": 16384,
    "max_block_header_length": 238,
    "max_operation_list_length": [ ],
    "baker": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",
    "level": { },
    "voting_period_kind": "testing_vote",
    "nonce_hash": null,
    "consumed_gas": "33225",
    "deactivated": [ ],
    "balance_updates": [ ]
},
```

```
"balance_updates": [
    {
        "kind": "contract",
        "contract": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",
        "change": "-512000000"
    },
    {
        "kind": "freezer",
        "category": "deposits",
        "delegate": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",
        "cycle": 122,
        "change": "512000000"
    },
    {
        "kind": "freezer",
        "category": "rewards",
        "delegate": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",
        "cycle": 122,
        "change": "16000000"
    }
]
```

Block structure

Operations

Operators changing the global state.

1st list: the **endorsements**.

2nd list: the operations regarding **votes and proposals**.

3rd list: anonymous operations.

The last list: the **manager operations** (reveal, transaction, delegation and origination).

Endorsement

```
{  
    "protocol": "Pt24m4xiPbLDhVgVfABUjirbmda3yohdN82Sp9FeuAXJ4eV9otd",  
    "chain_id": "NetXdQprcVkpawU",  
    "hash": "opahLb8SVpcrwVDgwPBAAUJHxt9g8YHRd6ckYBVMWfVzwK3z7xU",  
    "branch": "BKpumgUMxfMTwf8kRxNKAxBChGWU4FcZv188cnDzmHEqkzJHHzyW",  
    "contents": [  
        {  
            "kind": "endorsement",  
            "level": 503442,  
            "metadata": {  
                "balance_updates": [ ],  
                "delegate": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",  
                "slots": [  
                    4  
                ]  
            }  
        },  
        {"signature": "sigU4CYfBAYaoRXHnb4K8ZjtsnqW61zS3hNyU7Weo5ayEveP9qoz:1"}  
    ]  
}
```

```
1  {  
2      "protocol": "Pt24m4x...  
3      "chain_id": "NetXdQp...  
4      "hash": "BM45PLkPkvS...  
5      "header": { ... },  
21     "metadata": { ... },  
84     "operations": [ ... ]  
1056 }
```

```
"balance_updates": [  
    {  
        "kind": "contract",  
        "contract": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",  
        "change": "-64000000"  
    },  
    {  
        "kind": "freezer",  
        "category": "deposits",  
        "delegate": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",  
        "cycle": 122,  
        "change": "64000000"  
    },  
    {  
        "kind": "freezer",  
        "category": "rewards",  
        "delegate": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",  
        "cycle": 122,  
        "change": "2000000"  
    }  
],
```

Block structure

Manager operations

A manager operation has 3 important parameters:
counter, gas limit and storage limit.

Counter

Each **account** has the counter.

Making each operation **unique** and
applied only once in order.

Gas / Storage limit

An operation cannot consume more than these limits

Transactions

Messages between accounts

Signed by the private key of a manager with counter

Trigger for a smart contract to work

```
{
  "protocol": "Pt24m4xiPbLDhVgVfABUjirbmda3yohdN82Sp9FeuAXJ4eV9otd",
  "chain_id": "NetX0prcvkpaWU",
  "hash": "ooA4Mj8PQ1z5vfQRo4Mm85Y3wNxhPox6pvhPEGumouKrKZ5YeeS",
  "branch": "BKpumgUMxfMTwf8kRxNKaBChGWU4FcZv188cnDZmHEqKzJHHZYw",
  "contents": [
    {
      "kind": "transaction",
      "source": "tz1eZwq8b5cvE2bPKokatLkVMzkxz24z3Don",
      "fee": "1500",
      "counter": "16012",
      "gas_limit": "10300",
      "storage_limit": "0",
      "amount": "12650000",
      "destination": "KT1TxARNbCRbe2wVF87Ai7dq5vFCnWQRUYo3",
      "metadata": {
        "balance_updates": [
          {
            "kind": "contract",
            "contract": "tz1eZwq8b5cvE2bPKokatLkVMzkxz24z3Don",
            "change": "-1500"
          },
          {
            "kind": "freezer",
            "category": "fees",
            "delegate": "tz1Yju7jmmsaUiG9qQLoYv35v5pHgnWoLwbt",
            "cycle": 122,
            "change": "1500"
          }
        ],
        "operation_result": {
          "status": "applied",
          "balance_updates": [
            {
              "kind": "contract",
              "contract": "tz1eZwq8b5cvE2bPKokatLkVMzkxz24z3Don",
              "change": "-12650000"
            },
            {
              "kind": "contract",
              "contract": "KT1TxARNbCRbe2wVF87Ai7dq5vFCnWQRUYo3",
              "change": "12650000"
            }
          ],
          "consumed_gas": "10200"
        }
      }
    },
    "signature": "sigVmmPb2EsbCNJHnrF5jzFv21nZwtZexkXHe3fimVoPjtWcwYpVgLbexD"
  ]
}
```