Bringing custom sidechain

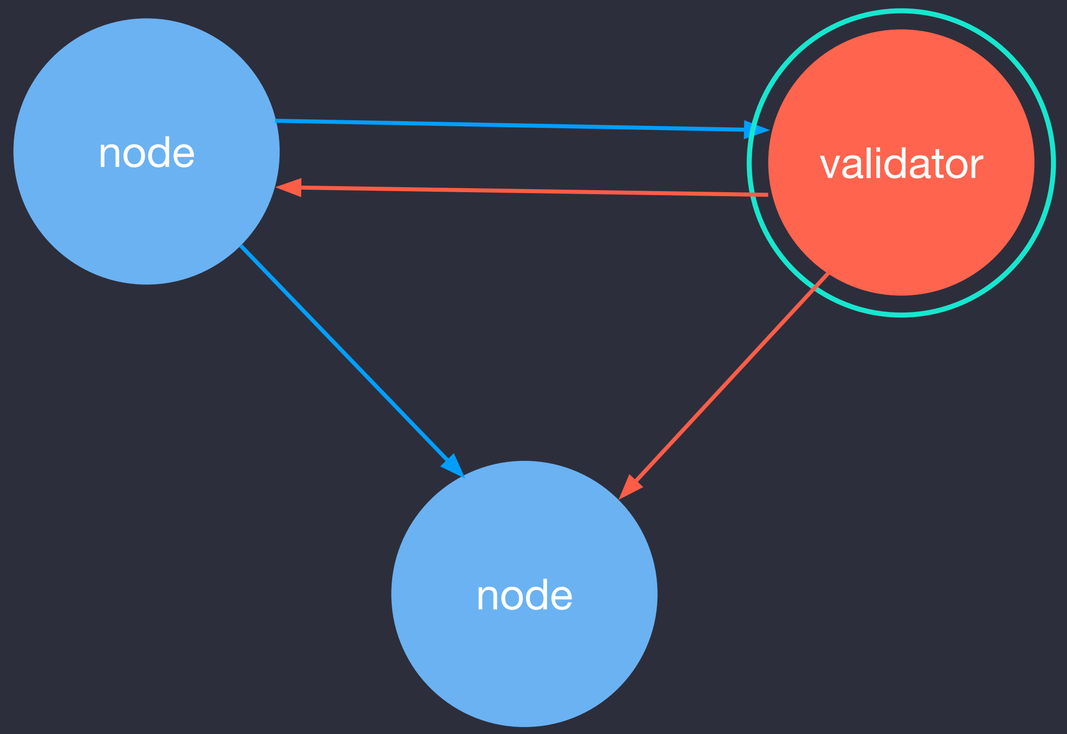
Distributed and decentralized systems in theory and practice

ZUEV EGOR

Blockchain

Blockchain – is immutable storage / ledger with decentralized peers and own consensus rules. All changes are made through the transactions.

Append new transaction



1 **Client broadcast the tx**

Client broadcast the unconfirmed tx to all known peers. No guarantees, that leader will receive it first.

2 **Validator validate the tx**

Validator validate the tx alongside with other txs in pool. Then form block by timer or by size.

3 **Validator mint block**

Validator mint block and replicate it over all known peers.

Time issues

Which factors can impact on new transaction to be included in block?

1 **Latency**

Delays between tx has been broadcasted and validator received it

2 **Fees**

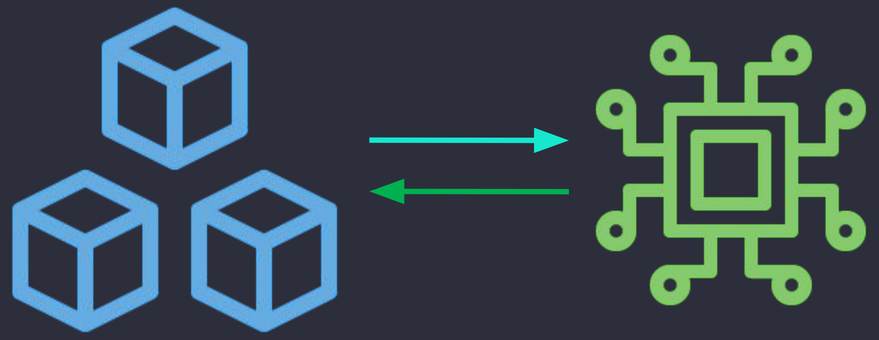
Higher fee – higher chances to be included in next block

3 **Block mint delay**

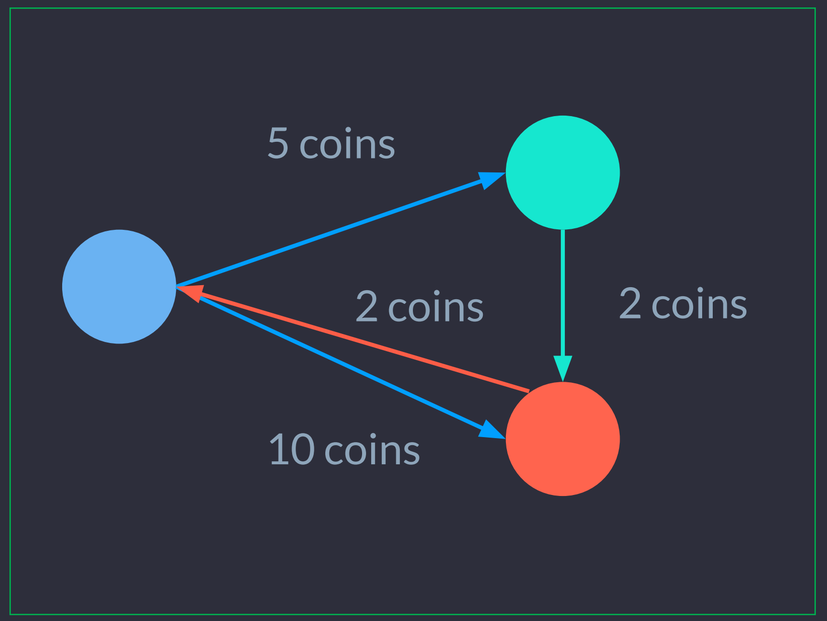
We have to wait, until blockchain will validate enough txs, or timer will be triggered

Off-chain

Off-chain is a pattern, where some operations, related to blockchain, are performed out of blockchain on custom platform



Off-chain concept



DELTA

Alice: -13 coins

Bob: +3 coins

Mike +10 coins

Transaction

1 **Alice**

TX1: Alice->Bob (5 coins)

TX2 Alice-> Mike (5 coins)

2 **Bob**

TX1: Bob->Mike (2 coins)

3 **Mike**

TX1: Mike->Alice (2 coins)

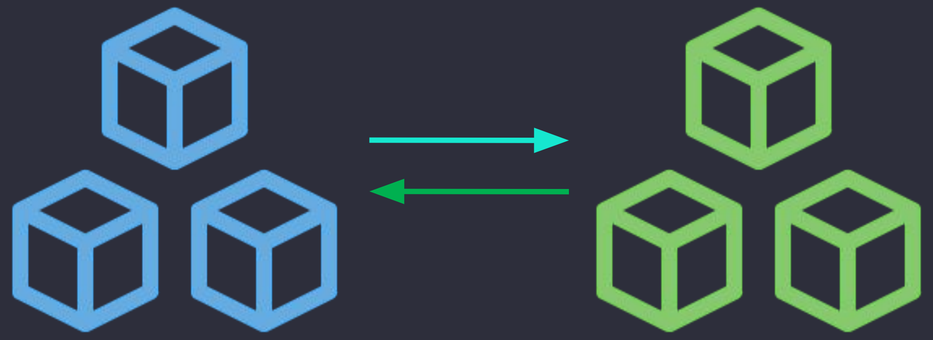
Off-chain implementations

General backend

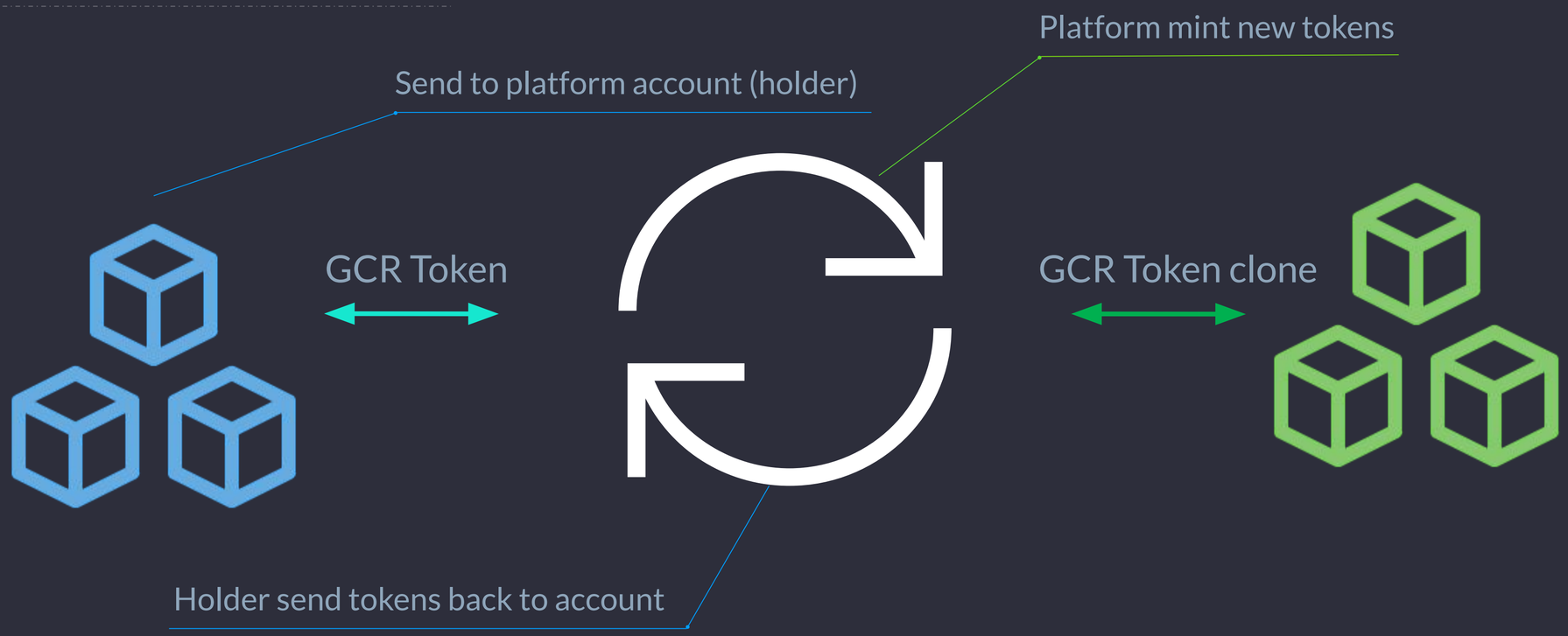
sidechain

Sidechain

Sidechain is a pattern, which allows to use certain blockchain tokens on another blockchain / platform with an ability to move these tokens to original chain



Sidechain


Platform mint new tokens
Send to platform account (holder)
GCR Token
GCR Token clone
Holder send tokens back to account

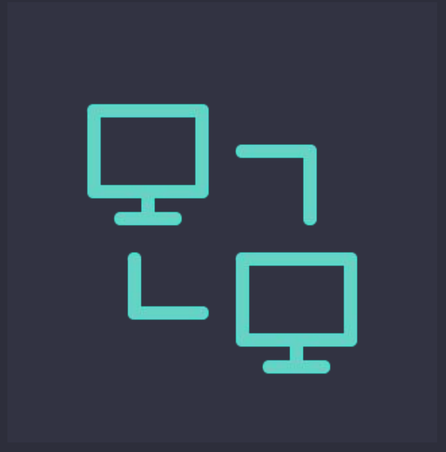
Cluster components

Properties

Run all rules against tx

Form global state of system

State machine



Properties

Replicate all data across the cluster

Take care of collisions

Consensus Engine

State machine

State machine with
Ganache

TRUFFLE

1 **Full EVM support**

Full EVM machine, as on Parity and Geth clients

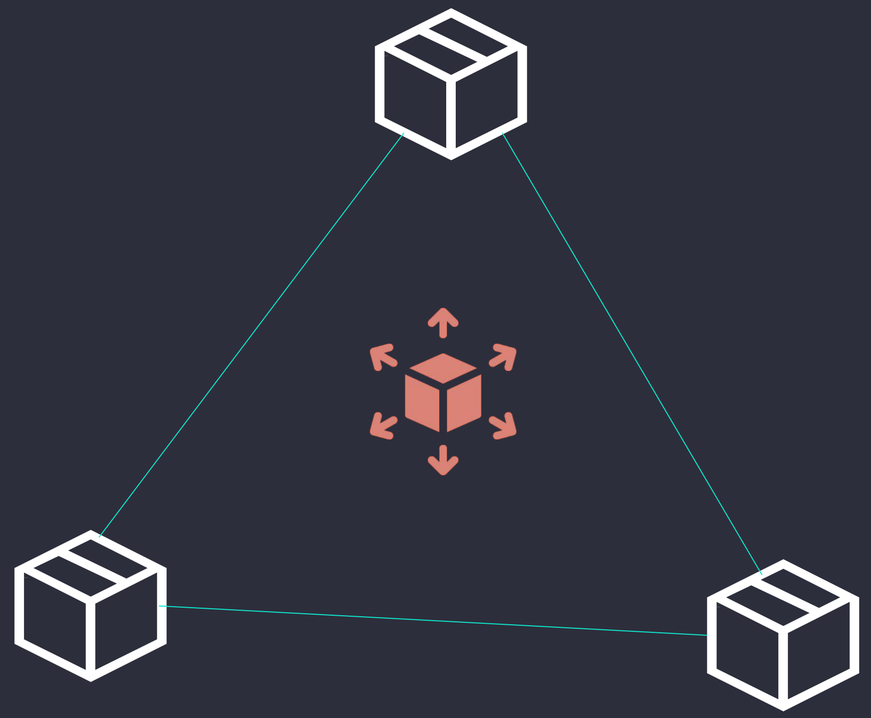
2 **Integrated client**

Can connect via web3

3 **Quick block minting**

Mint block per each performed action

Consensus Mokka



1 CP algorithm

MOKKA use single leadership model for making changes to RSM, however each follower may hold unconfirmed changes and replicate them (via gossip protocol).

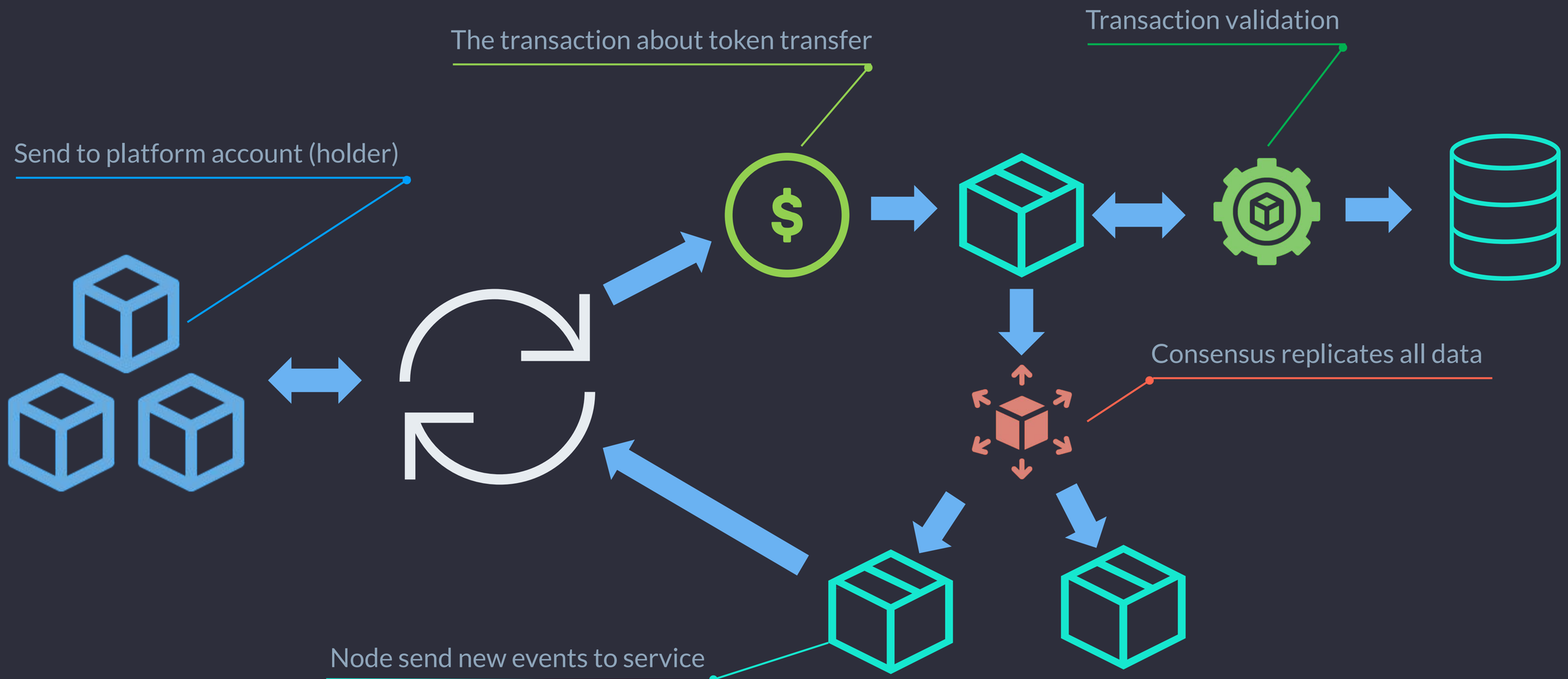
2 Sync system

MOKKA use internal timers for checking latency and timeouts (strategy nested from RAFT).

3 Performance

Due to single leadership model, MOKKA appends changes quite slow, as all of these changes have to be processed by single leader first.

Workflow


The transaction about token transfer
Transaction validation
Send to platform account (holder)
Consensus replicates all data
Node send new events to service

Real example

Distributed ganache

https://github.com/ega-forever/mokka/tree/master/examples/node/decentralized-ganache

Опрос

https://otus.ru/polls/6416/

Thanks for listening!

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