

Моделирование работы РР NEO с помощью MADT

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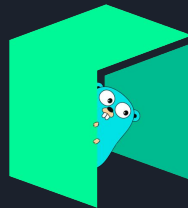


NEO Smart-Economy

Как вы знаете, сеть состоит из нод. В текущий момент ноды имеют несколько полностью совместимых друг с другом реализаций:

- C#: <https://github.com/neo-project/neo>
- Python: <https://github.com/CityOfZion/neo-python>
- Go: <https://github.com/nspcc-dev/neo-go>

Далее будем рассматривать реализацию на Go, поскольку она является наиболее быстрой (стабильная версия 2х).





MADT

Система для моделирования распределенных приложений, разработанная для изучения влияния условий сети на работу таких приложений и их тестирования.

С помощью данного инструмента:

1. Развернем распределенную сеть из четырех консенсус-узлов
2. Подключим к сети консенсусный узел, запущенный локально
3. Задеплоим смарт-контракт
4. Изучим поведение сети при блокировке некоторых узлов



Шаг 1. Конфигурация нод

```
protocol.privnet.docker.one.yml
1 ProtocolConfiguration:
2   Magic: 56753
3   AddressVersion: 23
4   SecondsPerBlock: 15
5   LowPriorityThreshold: 0.000
6   MemPoolSize: 50000
7   StandbyValidators:
8     - 02b3622bf4017bdfc317c58aed5f4c753f206b7db896046fa7d774bbc4bf7f8dc2
9     - 02103a7f7dd016558597f7960d27c516a4394fd968b9e65155eb4b013e4040406e
10    - 03d90c07df63e690ce77912e10ab51acc944b66860237b608c4f8f8309e71ee699
11    - 02a7bc55fe8684e0119768d104ba30795bdcc86619e864add26156723ed185cd62
12   SeedList:
13     - 15.0.0.2:20333
14     - 15.0.0.3:20334
15     - 15.0.0.4:20335
16     - 15.0.0.5:20336
17   SystemFee:
18     EnrollmentTransaction: 1000
19     IssueTransaction: 500
20     PublishTransaction: 500
21     RegisterTransaction: 10000
22   VerifyBlocks: true
23   VerifyTransactions: true
24
25 ApplicationConfiguration:
26   DBConfiguration:
27     Type: "leveldb"
28     LevelDBOptions:
29       DataDirectoryPath: "/chains/one"
30   NodePort: 20333
31   Relay: true
32   DialTimeout: 3
33   ProtoTickInterval: 2
34   PingInterval: 30
35   PingTimeout: 90
36   MaxPeers: 10
37   AttemptConnPeers: 5
38   MinPeers: 3
39   RPC:
40     Enabled: true
41     EnableCORSWorkaround: false
42     Port: 30333
```

```
Dockerfile
1 # Builder image
2 FROM golang:1-alpine as builder
3
4 RUN set -x \
5     && apk add --no-cache git \
6     && mkdir -p /tmp
7
8 COPY . /neo-go
9
10 WORKDIR /neo-go
11
12 ARG REPO=repository
13 ARG VERSION=dev
14
15 # https://github.com/golang/go/wiki/Modules#how-do-i-use-vendoring-with-modules-is-vendoring-going-away
16 # go build -mod=vendor
17 RUN set -x \
18     && export GOGC=off \
19     && export GO111MODULE=on \
20     && export CGO_ENABLED=0 \
21     && export LD_FLAGS="-X ${REPO}/config.Version=${VERSION}" \
22     && go build -v -mod=vendor -ldflags "${LD_FLAGS}" -o /go/bin/neo-go ./cli
23
24 # Executable image
25 FROM alpine
26
27 ARG VERSION
28 LABEL version=$VERSION
29
30 WORKDIR /
31
32 COPY --from=builder /neo-go/config/protocol.privnet.docker.one.yml /config/protocol.privnet.yml
33 COPY --from=builder /neo-go/.docker/6000-privnet-blocks.acc.gz /6000-privnet-blocks.acc.gz
34 COPY --from=builder /neo-go/.docker/1600-privnet-blocks-single.acc.gz /1600-privnet-blocks-single.acc.gz
35 COPY --from=builder /neo-go/.docker/privnet-entrypoint.sh /usr/bin/privnet-entrypoint.sh
36 COPY --from=builder /neo-go/.docker/wallets/wallet1.json /wallet1.json
37 COPY --from=builder /go/bin/neo-go /usr/bin/neo-go
38 COPY --from=builder /etc/ssl/certs/ca-certificates.crt /etc/ssl/certs/
39
40 ENTRYPOINT ["/usr/bin/privnet-entrypoint.sh"]
41
42 CMD ["node"]
```

https://github.com/AnnaShaleva/madt_sample/

Шаг 2. Построение образа ноды

\$ make env_image

```
99  # --- Environment ---
100  ▶ env_vendor:
101      @echo "=> Update vendor"
102      @go mod tidy
103      @go mod download
104      @go mod vendor
105
106  ▶ env_image: env_vendor
107      @echo "=> Building env image"
108      @docker build \
109          -t env_neo_go_image \
110          --build-arg REPO=$(REPO) \
111          --build-arg VERSION=$(VERSION) .
112
```

Шаг 3. Создание лаборатории

```
lab.py x
1 from mdt_lib.network import Network
2
3
4 def main():
5     net = Network('15.0.0.0/8')
6
7     # create network nodes
8     node1 = net.create_node('node1', image='env_neo_go_one_image',
9                             ports={'20333/tcp': 20333, '30333/tcp': 30333, '20001/tcp': 20001})
10    node2 = net.create_node('node2', image='env_neo_go_two_image',
11                            ports={'20334/tcp': 20334, '30334/tcp': 30334, '20002/tcp': 20002})
12    node3 = net.create_node('node3', image='env_neo_go_three_image',
13                            ports={'20335/tcp': 20335, '30335/tcp': 30335, '20003/tcp': 20003})
14    node4 = net.create_node('node4', image='env_neo_go_four_image',
15                            ports={'20336/tcp': 20336, '30336/tcp': 30336, '20004/tcp': 20004})
16
17    # create a local network that will connect all those nodes
18    net.create_subnet('net', (node1, node2, node3, node4))
19
20    # distribute IP addresses
21    net.configure(verbose=True)
22
23    # save lab
24    net.render('../../labs/basic_tutorial', verbose=True)
25
26
27 if __name__ == "__main__":
28     main()
29
```

Шаг 4. Запуск лаборатории

\$ python3 lab.py

```
neospcc@neospcc-ThinkPad-T590:~/madt/tutorials/basic$ python3 lab.py
net 15.0.0.0/29
node1
    [IPv4Address('15.0.0.2')]
    {}
node2
    [IPv4Address('15.0.0.3')]
    {}
node3
    [IPv4Address('15.0.0.4')]
    {}
node4
    [IPv4Address('15.0.0.5')]
    {}
```



Шаг 4. Запуск лаборатории

```
$ cd ../../
```

```
$ sudo -HE env PYTHONPATH=$HOME/madt:$PYTHONPATH SSH_PWD=demo python3  
madt_ui/main.py 80
```

```
neospcc@neospcc-ThinkPad-T590:~/madt$ sudo -HE env PYTHONPATH=$HOME/madt:$PYTHONPATH SSH_PWD=demo python3 madt_ui/main.py 80  
[sudo] password for neospcc:  
/usr/local/lib/python3.6/dist-packages/quart/app.py:1320: UserWarning: Additional arguments, threaded, processes, are not yet supported  
  "Additional arguments, {}, are not yet supported".format(', '.join(kwargs.keys())),  
Running on https://0.0.0.0:80 (CTRL + C to quit)  
[2020-04-10 16:12:41,693] ASGI Framework Lifespan error, continuing without Lifespan support  
[ msg ] None  
[2020-04-10 16:12:42,390] 127.0.0.1:46830 GET /messages.json 1.1 200 4 4071  
[ msg ] None  
[2020-04-10 16:12:43,390] 127.0.0.1:46830 GET /messages.json 1.1 200 4 4024  
[ msg ] None  
[2020-04-10 16:12:44,392] 127.0.0.1:46830 GET /messages.json 1.1 200 4 3911
```



```
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$ docker logs MADT_basic_tutorial_node1
```

```
=> Try to restore blocks before running node
2020-04-10T14:33:16.781Z INFO MaxTransactionsPerBlock is not set or wrong, setting default value (unlimited) {"MaxTransactionsPerBlock": 0}
2020-04-10T14:33:16.781Z INFO MaxFreeTransactionsPerBlock is not set or wrong, setting default value (unlimited) {"MaxFreeTransactionsPerBlock": 0}
2020-04-10T14:33:16.781Z INFO MaxFreeTransactionSize is not set or wrong, setting default value (unlimited) {"MaxFreeTransactionSize": 0}
2020-04-10T14:33:16.781Z INFO FeePerExtraByte is not set or wrong, setting default value {"FeePerExtraByte": 0}
2020-04-10T14:33:16.781Z INFO no storage version found! creating genesis block
2020-04-10T14:33:16.783Z INFO service is running {"service": "Prometheus", "endpoint": ":20001"}
2020-04-10T14:33:16.783Z INFO service hasn't started since it's disabled {"service": "Pprof"}
2020-04-10T14:33:17.801Z INFO blockchain persist completed {"persistedBlocks": 3386, "persistedKeys": 10178, "headerHeight": 3387, "blockHeight": 3386, "took": "17.406268ms"}
2020-04-10T14:33:18.795Z INFO shutting down service {"service": "Pprof", "endpoint": ":20011"}
2020-04-10T14:33:18.795Z INFO shutting down service {"service": "Prometheus", "endpoint": ":20001"}
2020-04-10T14:33:18.814Z INFO blockchain persist completed {"persistedBlocks": 2614, "persistedKeys": 7852, "headerHeight": 6000, "blockHeight": 6000, "took": "19.586336ms"}
2020-04-10T14:33:18.877Z INFO MaxTransactionsPerBlock is not set or wrong, setting default value (unlimited) {"MaxTransactionsPerBlock": 0}
2020-04-10T14:33:18.877Z INFO MaxFreeTransactionsPerBlock is not set or wrong, setting default value (unlimited) {"MaxFreeTransactionsPerBlock": 0}
2020-04-10T14:33:18.877Z INFO MaxFreeTransactionSize is not set or wrong, setting default value (unlimited) {"MaxFreeTransactionSize": 0}
2020-04-10T14:33:18.877Z INFO FeePerExtraByte is not set or wrong, setting default value {"FeePerExtraByte": 0}
2020-04-10T14:33:18.877Z INFO restoring blockchain {"version": "0.0.9"}
2020-04-10T14:33:18.880Z INFO service is running {"service": "Prometheus", "endpoint": ":20001"}
2020-04-10T14:33:18.880Z INFO service hasn't started since it's disabled {"service": "Pprof"}
```



```
/NEO-GO:/ker logs MADT_basic_tutorial_node1
```

```
2020-04-10T14:33:18.882Z INFO node started {"blockHeight": 6000, "headerHeight": 6000}
2020-04-10T14:33:18.882Z INFO starting rpc-server {"endpoint": ":30333"}
2020-04-10T14:33:18.882Z INFO new peer connected {"addr": "15.0.0.2:20333", "peerCount": 1}
2020-04-10T14:33:18.882Z INFO new peer connected {"addr": "15.0.0.2:43396", "peerCount": 2}
2020-04-10T14:33:18.882Z WARN peer disconnected {"addr": "15.0.0.2:43396", "reason": "identical node id", "peerCount": 1}
2020-04-10T14:33:18.885Z WARN peer disconnected {"addr": "15.0.0.2:20333", "reason": "identical node id", "peerCount": 0}
2020-04-10T14:33:19.720Z INFO new peer connected {"addr": "15.0.0.3:33842", "peerCount": 1}
2020-04-10T14:33:19.720Z INFO started protocol {"addr": "15.0.0.3:33842", "userAgent": "/NEO-GO/", "startHeight": 6000, "id": 706119040}
2020-04-10T14:33:19.720Z INFO new peer connected {"addr": "15.0.0.4:34680", "peerCount": 2}
2020-04-10T14:33:20.374Z INFO started protocol {"addr": "15.0.0.4:34680", "userAgent": "/NEO-GO/", "startHeight": 6000, "id": 1281548161}
2020-04-10T14:33:20.778Z INFO new peer connected {"addr": "15.0.0.5:42164", "peerCount": 3}
2020-04-10T14:33:20.778Z INFO node reached synchronized state, starting consensus
2020-04-10T14:33:20.778Z INFO started protocol {"addr": "15.0.0.5:42164", "userAgent": "/NEO-GO/", "startHeight": 6000, "id": 3523497397}
2020-04-10T14:33:21.113Z INFO initializing dbft {"height": 6001, "view": 0, "index": 2, "role": "Backup"}
2020-04-10T14:33:21.127Z INFO received PrepareRequest {"validator": 1, "tx": 1}
2020-04-10T14:33:21.127Z INFO sending PrepareResponse {"height": 6001, "view": 0}
2020-04-10T14:33:21.129Z INFO received PrepareResponse {"validator": 0}
2020-04-10T14:33:21.129Z INFO sending Commit {"height": 6001, "view": 0}
2020-04-10T14:33:21.130Z INFO received Commit {"validator": 0}
2020-04-10T14:33:21.133Z INFO received Commit {"validator": 1}
2020-04-10T14:33:21.133Z INFO approving block {"height": 6001, "hash": "a5f942f128ae2228c7786cfc516411929af9f2cad18cfa3ca990b56de3df660", "tx_count": 1, "merkle": "60c6bcbf6ff89e6a565fd3aacb25652b937d27b86adf65ab09b74b163c59ba6", "prev": "9f52e98ba22171192a948f60b4b43917af80f4426a7b4cb2f2752b57a443cc29"}
2020-04-10T14:33:21.502Z INFO initializing dbft {"height": 6002, "view": 0, "index": 2, "role": "Primary"}
2020-04-10T14:33:21.881Z INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6001, "blockHeight": 6001, "took": "324.069µs"}
2020-04-10T14:33:36.136Z INFO sending PrepareRequest {"height": 6002, "view": 0}
2020-04-10T14:33:36.145Z INFO received PrepareResponse {"validator": 3}
```

Шаг 4. Запуск лаборатории

basic_tutorial containers:

[back to list](#) [open graph](#) [restart](#) [stop](#)

- Uptime: 0 sec.
- Avg. traffic: 0
- Messages: 0

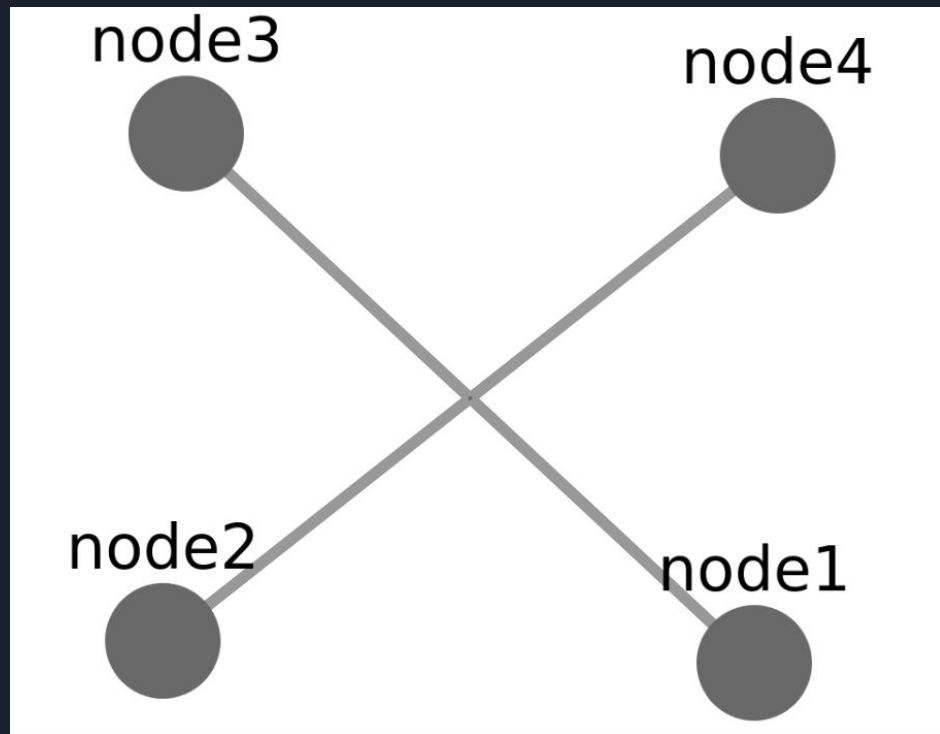
Filter

MADT_basic_tutorial_node4
(env_neo_go_four_image:latest)

MADT_basic_tutorial_node3
(env_neo_go_three_image:latest)

MADT_basic_tutorial_node2
(env_neo_go_two_image:latest)

MADT_basic_tutorial_node1
(env_neo_go_one_image:latest)



Шаг 5. Конфигурация и запуск локальной ноды

```
protocolprivnet.yml
1 ProtocolConfiguration:
2   Magic: 56753
3   AddressVersion: 23
4   SecondsPerBlock: 15
5   LowPriorityThreshold: 0.000
6   MemPoolSize: 50000
7   StandbyValidators:
8     - 02b3622bfa017bdfc317c58aed5f4c753f206b7db896046fa7d774bbc4bf7f8dc2
9     - 02103a7f7dd016558597f7960d27c516a4394fd968b9e65155eb4b013e4040406e
10    - 03d90c07df63e690ce77912e10ab51acc044b66860237b608c4ff8f8309e71ee699
11    - 02a7bc55fe8684e0119768d104ba30795bdc86619e864add26156723ed185cd62
12   SeedList:
13     - 0.0.0.0:20333
14     - 0.0.0.0:20334
15     - 0.0.0.0:20335
16     - 0.0.0.0:20336
17   SystemFee:
18     EnrollmentTransaction: 1000
19     IssueTransaction: 500
20     PublishTransaction: 500
21     RegisterTransaction: 10000
22     VerifyBlocks: true
23     VerifyTransactions: true
24
25   ApplicationConfiguration:
26     # LogPath could be set up in case you need stdout logs to some proper file.
27     # LogPath: "/log/neo-go.log"
28   DBConfiguration:
29     Type: "leveldb" #other options: 'inmemory', 'redis', 'bolt', 'badgerdb'.
30     # DB type options. Uncomment those you need in case you want to switch DB type.
31     LevelDBOptions:
32       DataDirectoryPath: "./chains/privnet"
33     # RedisDBOptions:
34     #   Addr: "localhost:6379"
35     #   Password: ""
36     #   DB: 0
37     # BoltDBOptions:
38     #   FilePath: "./chains/privnet.bolt"
39     # BadgerDBOptions:
40     #   BadgerDir: "./chains/privnet.badger"
41     # Uncomment in order to set up custom address for node.
42     # Address: 127.0.0.1
43     NodePort: 20332
44     Relay: true
45     DialTimeout: 3
46     ProtoTickInterval: 2
47     PingInterval: 30
48     PingTimeout: 90
49     MaxPeers: 10
```

`$./bin/neo-go node --privnet`

<https://github.com/nspcc-dev/neo-go-sc-wrkshp>


```
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$ ./bin/neo-go node --privnet
2020-04-10T23:04:22.611+0300 INFO MaxTransactionsPerBlock is not set or wrong, setting default value (unlimited) {"MaxTransactionsPerBlock": 0}
2020-04-10T23:04:22.612+0300 INFO MaxFreeTransactionsPerBlock is not set or wrong, setting default value (unlimited) {"MaxFreeTransactionsPerBlock": 0}
2020-04-10T23:04:22.612+0300 INFO MaxFreeTransactionSize is not set or wrong, setting default value (unlimited) {"MaxFreeTransactionSize": 0}
2020-04-10T23:04:22.612+0300 INFO FeePerExtraByte is not set or wrong, setting default value {"FeePerExtraByte": 0}
2020-04-10T23:04:22.612+0300 INFO restoring blockchain {"version": "0.0.9"}
```



```
2020-04-10T23:04:22.613+0300 INFO service is running {"service": "Prometheus", "endpoint": ":2112"}
/NEO-GO:0.74.1-pre-124-q4b5cc0b/
```

```
2020-04-10T23:04:22.613+0300 INFO service hasn't started since it's disabled {"service": "Pprof"}
2020-04-10T23:04:22.613+0300 INFO starting rpc-server {"endpoint": ":20331"}
2020-04-10T23:04:22.613+0300 INFO node started {"blockHeight": 0, "headerHeight": 0}
2020-04-10T23:04:22.614+0300 INFO new peer connected {"addr": "127.0.0.1:20336", "peerCount": 1}
2020-04-10T23:04:22.615+0300 INFO new peer connected {"addr": "127.0.0.1:20333", "peerCount": 2}
2020-04-10T23:04:22.615+0300 INFO new peer connected {"addr": "127.0.0.1:20335", "peerCount": 3}
2020-04-10T23:04:22.615+0300 INFO new peer connected {"addr": "127.0.0.1:20334", "peerCount": 4}
2020-04-10T23:04:22.615+0300 INFO started protocol {"addr": "127.0.0.1:20336", "userAgent": "/NEO-GO:/", "startHeight": 6161, "id": 1650581299}
2020-04-10T23:04:22.617+0300 INFO started protocol {"addr": "127.0.0.1:20333", "userAgent": "/NEO-GO:/", "startHeight": 6161, "id": 1281968473}
2020-04-10T23:04:22.618+0300 INFO started protocol {"addr": "127.0.0.1:20335", "userAgent": "/NEO-GO:/", "startHeight": 6161, "id": 2266008009}
2020-04-10T23:04:22.618+0300 INFO started protocol {"addr": "127.0.0.1:20334", "userAgent": "/NEO-GO:/", "startHeight": 6161, "id": 684569182}
2020-04-10T23:04:23.617+0300 INFO blockchain persist completed {"persistedBlocks": 0, "persistedKeys": 2002, "headerHeight": 2000, "blockHeight": 0, "took": "4.242194ms"}
2020-04-10T23:04:24.624+0300 INFO blockchain persist completed {"persistedBlocks": 0, "persistedKeys": 2002, "headerHeight": 4000, "blockHeight": 0, "took": "6.323533ms"}
2020-04-10T23:04:25.643+0300 INFO blockchain persist completed {"persistedBlocks": 200, "persistedKeys": 2764, "headerHeight": 6161, "blockHeight": 200, "took": "19.263451ms"}
2020-04-10T23:04:26.646+0300 INFO blockchain persist completed {"persistedBlocks": 125, "persistedKeys": 376, "headerHeight": 6161, "blockHeight": 325, "took": "2.416132ms"}
2020-04-10T23:04:27.658+0300 INFO blockchain persist completed {"persistedBlocks": 99, "persistedKeys": 298, "headerHeight": 6161, "blockHeight": 424, "took": "11.888382ms"}
2020-04-10T23:04:28.661+0300 INFO blockchain persist completed {"persistedBlocks": 465, "persistedKeys": 1396, "headerHeight": 6161, "blockHeight": 889, "took": "2.746572ms"}
2020-04-10T23:04:30.671+0300 INFO blockchain persist completed {"persistedBlocks": 585, "persistedKeys": 1761, "headerHeight": 6161, "blockHeight": 1474, "took": "9.610958ms"}
2020-04-10T23:04:32.687+0300 INFO blockchain persist completed {"persistedBlocks": 568, "persistedKeys": 1795, "headerHeight": 6161, "blockHeight": 2042, "took": "15.749931ms"}
2020-04-10T23:04:34.693+0300 INFO blockchain persist completed {"persistedBlocks": 312, "persistedKeys": 937, "headerHeight": 6161, "blockHeight": 2354, "took": "4.881182ms"}
2020-04-10T23:04:36.700+0300 INFO blockchain persist completed {"persistedBlocks": 488, "persistedKeys": 1465, "headerHeight": 6161, "blockHeight": 2842, "took": "6.780262ms"}
2020-04-10T23:04:38.706+0300 INFO blockchain persist completed {"persistedBlocks": 350, "persistedKeys": 1051, "headerHeight": 6161, "blockHeight": 3192, "took": "5.519186ms"}
2020-04-10T23:04:40.716+0300 INFO blockchain persist completed {"persistedBlocks": 631, "persistedKeys": 1894, "headerHeight": 6161, "blockHeight": 3823, "took": "9.846941ms"}
2020-04-10T23:04:42.751+0300 INFO blockchain persist completed {"persistedBlocks": 705, "persistedKeys": 2122, "headerHeight": 6161, "blockHeight": 4528, "took": "33.817549ms"}
2020-04-10T23:04:44.764+0300 INFO blockchain persist completed {"persistedBlocks": 719, "persistedKeys": 2158, "headerHeight": 6161, "blockHeight": 5247, "took": "13.178806ms"}
2020-04-10T23:04:46.778+0300 INFO blockchain persist completed {"persistedBlocks": 693, "persistedKeys": 2080, "headerHeight": 6161, "blockHeight": 5940, "took": "13.243171ms"}
2020-04-10T23:04:48.783+0300 INFO blockchain persist completed {"persistedBlocks": 223, "persistedKeys": 671, "headerHeight": 6163, "blockHeight": 6163, "took": "4.797664ms"}
2020-04-10T23:04:58.786+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6164, "blockHeight": 6164, "took": "109.561µs"}
2020-04-10T23:05:13.789+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6165, "blockHeight": 6165, "took": "89.911µs"}
2020-04-10T23:05:28.793+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6166, "blockHeight": 6166, "took": "79.731µs"}
2020-04-10T23:05:43.796+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6167, "blockHeight": 6167, "took": "105.298µs"}
2020-04-10T23:05:58.799+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6168, "blockHeight": 6168, "took": "97.47µs"}
```

Шаг 6. Деплой и вызов смарт-контракта

```
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$ ./bin/neo-go contract compile -i ../neo-go-sc-wrkshp/1-print.go
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$ ./bin/neo-go contract deploy -i ../neo-go-sc-wrkshp/1-print.avm -c ../neo-go-sc-wrkshp/1-print.yml -e http://localhost:20331 -w ../neo-go-sc-wrkshp/my_wallet.json -g 0.001
Enter account AK2nJJpJr6o664CWJKi1QRXjqeic2zRp8y password >
Sent deployment transaction 5c11b955442414cec09bcf0e9bfb066d566d722921f933b84768b7b5c4058e0c for contract 6d1eeca891ee93de2b7a77eb91c26f3b3c04d6cf
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$ ./bin/neo-go contract invokefunction -e http://localhost:20331 -w ../neo-go-sc-wrkshp/my_wallet.json -g 0.00001 6d1eeca891ee93de2b7a77eb91c26f3b3c04d6cf
Enter account AK2nJJpJr6o664CWJKi1QRXjqeic2zRp8y password >
Sent invocation transaction 19e7be532824dce6720e076593a224a829bdc71d3d97af21a230d44d52f7dd0
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$ curl -d '{"jsonrpc": "2.0", "id": 1, "method": "getapplicationlog", "params": [{"19e7be532824dce6720e076593a224a829bdc71d3d97af21a230d44d52f7dd0"}]}' localhost:20331 | json_pp
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
   Dload  Upload  Total      Dload  Upload  Total      Dload  Upload  Spent    Left   Speed
100    478    100    338    100    140    84500    35000  --:--:-- --:--:-- --:--:--   116k
{
  "id" : 1,
  "result" : {
    "txid" : "0x19e7be532824dce6720e076593a224a829bdc71d3d97af21a230d44d52f7dd0",
    "executions" : [
      {
        "trigger" : "Application",
        "contract" : "0xb64cab6a17d8bda55890564052769d327c82bb9d",
        "stack" : [
          {
            "value" : [],
            "type" : "Array"
          },
          {
            "value" : "",
            "type" : "ByteArray"
          }
        ],
        "gas_consumed" : "0.017",
        "notifications" : [],
        "vnstate" : "HALT"
      }
    ]
  },
  "jsonrpc" : "2.0"
}
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$
```


Шаг 6. Деплой и вызов смарт-контракта

```
2020-04-10T23:17:43.904+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6216, "blockHeight": 6216, "took": "333.722µs"}
2020-04-10T23:18:00.969+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6217, "blockHeight": 6217, "took": "312.871µs"}
2020-04-10T23:18:15.974+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6218, "blockHeight": 6218, "took": "219.156µs"}
2020-04-10T23:18:30.979+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6219, "blockHeight": 6219, "took": "296.164µs"}
2020-04-10T23:18:45.983+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6220, "blockHeight": 6220, "took": "229.216µs"}
2020-04-10T23:19:00.986+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6221, "blockHeight": 6221, "took": "229.581µs"}
2020-04-10T23:19:12.634+0300 INFO runtime log {"script": "cfd6043c3b6fc291eb777a2bde93ee91a8ec1e6d", "logs": "\\\"Hello, world!\\\""}
2020-04-10T23:19:15.188+0300 INFO runtime log {"script": "cfd6043c3b6fc291eb777a2bde93ee91a8ec1e6d", "logs": "\\\"Hello, world!\\\""}
2020-04-10T23:19:15.990+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 11, "headerHeight": 6222, "blockHeight": 6222, "took": "718.777µs"}
2020-04-10T23:19:30.993+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6223, "blockHeight": 6223, "took": "223.926µs"}
2020-04-10T23:19:45.997+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6224, "blockHeight": 6224, "took": "204.326µs"}
2020-04-10T23:20:01.000+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6225, "blockHeight": 6225, "took": "185.5µs"}
2020-04-10T23:20:16.004+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6226, "blockHeight": 6226, "took": "213.156µs"}
2020-04-10T23:20:31.008+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6227, "blockHeight": 6227, "took": "267.308µs"}
2020-04-10T23:20:46.012+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6228, "blockHeight": 6228, "took": "214.776µs"}
```

```
2020-04-10T20:19:15.184Z INFO approving block {"height": 6222, "hash": "2519d2dfbea5dbee1f2a69da403fa93278a3cfa297ff086b10f7240d628be32", "tx_count": 2, "merkle": "dea3f72f4d347625fe64072124150f50129ed416be963454b63f017a7b18ba3", "prev": "490fc2dd3d73ee6ea3cd8ffed163e465577c37ac4305f986cd69f937ff8127a7"}
2020-04-10T20:19:15.185Z INFO runtime log {"script": "cfd6043c3b6fc291eb777a2bde93ee91a8ec1e6d", "logs": "\\\"Hello, world!\\\""}
2020-04-10T20:19:15.548Z INFO initializing dbft {"height": 6223, "view": 0, "index": 2, "role": "Backup"}
2020-04-10T20:19:16.141Z INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 11, "headerHeight": 6222, "blockHeight": 6222, "took": "257.415µs"}
2020-04-10T20:19:30.194Z INFO received PrepareRequest {"validator": 3, "tx": 1}
2020-04-10T20:19:30.196Z INFO sending PrepareResponse {"height": 6223, "view": 0}
2020-04-10T20:19:30.198Z INFO received PrepareResponse {"validator": 0}
2020-04-10T20:19:30.198Z INFO sending Commit {"height": 6223, "view": 0}
2020-04-10T20:19:30.198Z INFO received PrepareResponse {"validator": 1}
2020-04-10T20:19:30.199Z INFO received Commit {"validator": 0}
2020-04-10T20:19:30.200Z INFO received Commit {"validator": 1}
2020-04-10T20:19:30.200Z INFO approving block {"height": 6223, "hash": "b6cd96a9f0ef9b807536ef3de496009362f68268159132fdf431332390455c5c", "tx_count": 1, "merkle": "6fed90843f0a7a9fed030059e5c09f35b418116fe10d8372348e0c46c4669b45", "prev": "2519d2dfbea5dbee1f2a69da403fa93278a3cfa297ff086b10f7240d628be32"}
2020-04-10T20:19:30.550Z INFO initializing dbft {"height": 6224, "view": 0, "index": 2, "role": "Backup"}
2020-04-10T20:19:31.144Z INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6223, "blockHeight": 6223, "took": "197.46µs"}
2020-04-10T20:19:45.209Z INFO received PrepareRequest {"validator": 0, "tx": 1}
2020-04-10T20:19:45.211Z INFO sending PrepareResponse {"height": 6224, "view": 0}
2020-04-10T20:19:45.215Z INFO received PrepareResponse {"validator": 1}
2020-04-10T20:19:45.216Z INFO sending Commit {"height": 6224, "view": 0}
2020-04-10T20:19:45.217Z INFO received PrepareResponse {"validator": 3}
2020-04-10T20:19:45.225Z INFO received Commit {"validator": 1}
```

Шаг 7. Поведение сети при блокировке узлов

Container

MADT_basic_tutorial_node1

[back to lab](#)

- id: d33436df01
- status: running
- networks: MADT_basic_tutorial_net;

Router control panel

reset

rate

10

⬆

⬇

Gbps

delay

0

⬆

⬇

msec

delay dist.

0

⬆

⬇

msec

loss

corrupt

reorder

duplicate

tcset

Нода 1

```
e26875b9edc3734f0aa01ca01a78644cad", "prev": "59e9e5893/65f5013229a55c1a92ce26480b132134490eb9400838d0944d091"}
2020-04-10T20:29:01.286Z INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6261, "blockHeight": 6261, "took": "71.934µs"}
2020-04-10T20:29:01.426Z INFO initializing dbft {"height": 6262, "view": 0, "index": 2, "role": "Primary"}
2020-04-10T20:29:16.071Z INFO sending PrepareRequest {"height": 6262, "view": 0}
2020-04-10T20:29:16.081Z INFO received PrepareResponse {"validator": 1}
2020-04-10T20:29:16.082Z INFO received PrepareResponse {"validator": 3}
2020-04-10T20:29:16.083Z INFO sending Commit {"height": 6262, "view": 0}
2020-04-10T20:29:16.088Z INFO received PrepareResponse {"validator": 0}
2020-04-10T20:29:16.089Z INFO received Commit {"validator": 3}
2020-04-10T20:29:16.098Z INFO received Commit {"validator": 0}
2020-04-10T20:29:16.098Z INFO approving block {"height": 6262, "hash": "e9f54bd831ef5c3e908f907a0675c349b194abc3ef0117b30f885ed43eb729d9", "tx_count": 1, "merkle": "d3f89cada6b3a444baac9c1239e4ac055c826312df3d547885c442e5d282c299", "prev": "ad89d0f6264afd195c68dda59cd339789d0e7a549d9ca2e83b3f21d99a5cf9dd"}
2020-04-10T20:29:16.302Z INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6262, "blockHeight": 6262, "took": "86.734µs"}
2020-04-10T20:29:16.488Z INFO initializing dbft {"height": 6263, "view": 0, "index": 2, "role": "Backup"}
neospcc@neospcc-ThinkPad-T590:~/Documents/GitProjects/neo-go$
```

Нода 2

```
b2db7c455c5271ab45df60af50ba2cf54b", "prev": "ec9ae652a346e760da35d3329d6a577ddbaab0b93e480245494ba7167256a361"}
2020-04-10T20:31:32.175Z INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6266, "blockHeight": 6266, "took": "71.86µs"}
2020-04-10T20:31:32.257Z INFO initializing dbft {"height": 6267, "view": 0, "index": 0, "role": "Backup"}
2020-04-10T20:31:37.206Z WARN peer disconnected {"addr": "15.0.0.2:20333", "reason": "EOF", "peerCount": 3}
2020-04-10T20:31:37.209Z INFO new peer connected {"addr": "127.0.0.1:20334", "peerCount": 4}
2020-04-10T20:31:37.209Z INFO new peer connected {"addr": "127.0.0.1:36260", "peerCount": 5}
2020-04-10T20:31:37.209Z WARN peer disconnected {"addr": "127.0.0.1:36260", "reason": "identical node id", "peerCount": 4}
2020-04-10T20:31:37.209Z WARN peer disconnected {"addr": "127.0.0.1:20334", "reason": "identical node id", "peerCount": 3}
2020-04-10T20:31:46.905Z INFO received PrepareRequest {"validator": 3, "tx": 1}
2020-04-10T20:31:46.907Z INFO sending PrepareResponse {"height": 6267, "view": 0}
2020-04-10T20:31:46.911Z INFO received PrepareResponse {"validator": 1}
2020-04-10T20:31:46.911Z INFO sending Commit {"height": 6267, "view": 0}
2020-04-10T20:31:46.920Z INFO received Commit {"validator": 1}
2020-04-10T20:31:46.925Z INFO received Commit {"validator": 3}
2020-04-10T20:31:46.926Z INFO approving block {"height": 6267, "hash": "273fd2f5896e02f091b864f2b13436526101ba41addb17eb8be8227b87c7d76e", "tx_count": 1, "merkle": "678012d1e10dc5bcc7644857c415cdebff9784f20e1671beb4a257d6a4c967362", "prev": "354891c240aa7c9390aa16ce4704bfd16f34c3ef84aa8299586712c7d6844afe"}
2020-04-10T20:31:47.180Z INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6267, "blockHeight": 6267, "took": "69.548µs"}
2020-04-10T20:31:47.294Z INFO initializing dbft {"height": 6268, "view": 0, "index": 0, "role": "Primary"}
2020-04-10T20:32:01.929Z INFO sending PrepareRequest {"height": 6268, "view": 0}
2020-04-10T20:32:01.937Z INFO received PrepareResponse {"validator": 1}
2020-04-10T20:32:01.939Z INFO received PrepareResponse {"validator": 3}
2020-04-10T20:32:01.939Z INFO sending Commit {"height": 6268, "view": 0}
2020-04-10T20:32:01.947Z INFO received Commit {"validator": 1}
2020-04-10T20:32:01.951Z INFO received Commit {"validator": 3}
2020-04-10T20:32:01.952Z INFO approving block {"height": 6268, "hash": "5e5ebebe418fbf58cd115fb1a56cde039d2368532094a4e8bc719ec91debeee3", "tx_count": 1, "merkle": "a6cbcd00e0a80347033d2db3424b2d
```


Локальная нода

```
2020-04-10T23:30:02.145+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6265, "blockHeight": 6265, "took": "204.15µs"}
2020-04-10T23:31:32.165+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6266, "blockHeight": 6266, "took": "74.255µs"}
2020-04-10T23:31:37.207+0300 WARN peer disconnected {"addr": "127.0.0.1:20333", "reason": "EOF", "peerCount": 3}
2020-04-10T23:31:37.207+0300 INFO new peer connected {"addr": "127.0.0.1:20333", "peerCount": 4}
2020-04-10T23:31:38.211+0300 INFO new peer connected {"addr": "192.168.112.2:54202", "peerCount": 5}
2020-04-10T23:31:39.043+0300 INFO started protocol {"addr": "192.168.112.2:54202", "userAgent": "/NEO-GO/", "startHeight": 6263, "id": 1281968473}
2020-04-10T23:31:47.168+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6267, "blockHeight": 6267, "took": "73.516µs"}
2020-04-10T23:32:02.171+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6268, "blockHeight": 6268, "took": "151.032µs"}
2020-04-10T23:32:17.174+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6269, "blockHeight": 6269, "took": "75.46µs"}
2020-04-10T23:33:44.227+0300 INFO new peer connected {"addr": "192.168.112.2:54306", "peerCount": 6}
2020-04-10T23:33:44.227+0300 WARN peer disconnected {"addr": "192.168.112.2:54306", "reason": "already connected", "peerCount": 5}
2020-04-10T23:33:46.509+0300 WARN peer disconnected {"addr": "127.0.0.1:20333", "reason": "read tcp 127.0.0.1:52446->127.0.0.1:20333: read: connection reset by peer", "peerCount": 4}
2020-04-10T23:33:48.196+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6270, "blockHeight": 6270, "took": "231.879µs"}
2020-04-10T23:34:03.200+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6271, "blockHeight": 6271, "took": "193.827µs"}
2020-04-10T23:34:22.625+0300 WARN peer disconnected {"addr": "192.168.112.2:54202", "reason": "ping/pong timeout", "peerCount": 3}
2020-04-10T23:34:40.208+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6272, "blockHeight": 6272, "took": "212.497µs"}
2020-04-10T23:34:55.212+0300 INFO blockchain persist completed {"persistedBlocks": 1, "persistedKeys": 5, "headerHeight": 6273, "blockHeight": 6273, "took": "223.162µs"}
```



Спасибо за внимание!

https://github.com/AnnaShaleva/madt_sample

<https://github.com/nspcc-dev/neo-go-sc-wrkshp>

<https://github.com/nspcc-dev/neo-go/tree/master-2.x>