

## CA2 – Part 2

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```

1  {
2      "config": {
3          "chainId": 15,
4          "homesteadBlock": 0,
5          "eip155Block": 0,
6          "eip158Block": 0
7      },
8      "difficulty": "400000",
9      "gasLimit": "2100000",
10     "alloc": {
11         "[Account #1 Address]": {"balance": "1000000000810100253"},
12         "[Account #2 Address]": {"balance": "2000000000810100253"},
13         "[Account #3 Address]": {"balance": "1500000000810100253"}
14     }
15 }

```

```

mralavi@mralavi-virtual-machine: ~/Desktop/ca2
mralavi@mralavi-virtual-machine:~/Desktop/ca2$ mkdir node01 node02 node03
mralavi@mralavi-virtual-machine:~/Desktop/ca2$

```

```

mralavi@mralavi-virtual-machine: ~/Desktop/ca2
mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node01/" account new
INFO [05-25|20:29:43.500] Maximum peer count          ETH=50 LES=0 total=50
INFO [05-25|20:29:43.502] Smartcard socket not found, disabling   err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:
Your new key was generated

Public address of the key: 0x54C3a4856eAf2C92bBb2D4dDf2155beBD8134d20
Path of the secret key file: /home/mralavi/Desktop/ca2/node01/keystore/UTC--2024-05-25T16-59-55.319671789Z--54c3a4856eaf2c92bb2d4ddf2155bebd8134d20

You can share your public address with anyone. Others need it to interact with you.
You must NEVER share the secret key with anyone! The key controls access to your funds!
You must BACKUP your key file! Without the key, it's impossible to access account funds!
You must REMEMBER your password! Without the password, it's impossible to decrypt the key!

mralavi@mralavi-virtual-machine:~/Desktop/ca2$

```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2

mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node02/" account new
INFO [05-25|20:46:34.098] Maximum peer count          ETH=50 LES=0 total=50
INFO [05-25|20:46:34.098] Smartcard socket not found, disabling  err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:

Your new key was generated

Public address of the key: 0x7963044E471A50d34Dd49a173d9f49EB9b4e8907
Path of the secret key file: /home/mralavi/Desktop/ca2/node02/keystore/UTC--2024-05-25T17-16-43.955053860Z--7963044e471a50d34d49a173d9f49eb9b4e8907

- You can share your public address with anyone. Others need it to interact with you.
- You must NEVER share the secret key with anyone! The key controls access to your funds!
- You must BACKUP your key file! Without the key, it's impossible to access account funds!
- You must REMEMBER your password! Without the password, it's impossible to decrypt the key!

mralavi@mralavi-virtual-machine:~/Desktop/ca2$
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2

mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node03/" account new
INFO [05-25|20:47:51.125] Maximum peer count          ETH=50 LES=0 total=50
INFO [05-25|20:47:51.126] Smartcard socket not found, disabling  err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:

Your new key was generated

Public address of the key: 0x8849AB44426492496Ec4CCe80dCC6C668DE5B5dd
Path of the secret key file: /home/mralavi/Desktop/ca2/node03/keystore/UTC--2024-05-25T17-17-58.304091216Z--8849ab44426492496e4cce80dccc6c668de5b5dd

You can share your public address with anyone. Others need it to interact with you.
You must NEVER share the secret key with anyone! The key controls access to your funds!
You must BACKUP your key file! Without the key, it's impossible to access account funds!
You must REMEMBER your password! Without the password, it's impossible to decrypt the key!

mralavi@mralavi-virtual-machine:~/Desktop/ca2$
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2

mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node01/" init "/home/mralavi/Desktop/ca2/genesis.json"
INFO [05-26|11:22:31.886] Maximum peer count          ETH=50 LES=0 total=50
INFO [05-26|11:22:31.887] Smartcard socket not found, disabling  err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [05-26|11:22:31.891] Set global gas cap          cap=50,000,000
INFO [05-26|11:22:31.895] Using leveldb as the backing database
INFO [05-26|11:22:31.895] Allocated cache and file handles
INFO [05-26|11:22:31.902] Using LevelDB as the backing database
INFO [05-26|11:22:31.912] Opened ancient database
INFO [05-26|11:22:31.912] Writing custom genesis block
INFO [05-26|11:22:31.913] Persisted trie from memory database
INFO [05-26|11:22:31.913] Successfully wrote genesis state
INFO [05-26|11:22:31.914] Using leveldb as the backing database
INFO [05-26|11:22:31.915] Allocated cache and file handles
INFO [05-26|11:22:31.919] Using LevelDB as the backing database
INFO [05-26|11:22:31.919] Opened ancient database
INFO [05-26|11:22:31.919] Writing custom genesis block
INFO [05-26|11:22:31.920] Persisted trie from memory database
INFO [05-26|11:22:31.920] Successfully wrote genesis state
mralavi@mralavi-virtual-machine:~/Desktop/ca2$

database=/home/mralavi/Desktop/ca2/node01/chaindata cache=16.00MiB handles=16
database=/home/mralavi/Desktop/ca2/node01/chaindata/ancient/chain readonly=false
nodes=4 size=585.00B tline="87.627µs" gcnodes=0 gcsiz=0.00B gctline=0s livenodes=1 livenessize=0.00B
database=chaindata hash=310acd..806a06

database=/home/mralavi/Desktop/ca2/node01/chaindata/ancient/chain readonly=false
nodes=4 size=585.00B tline="46.078µs" gcnodes=0 gcsiz=0.00B gctline=0s livenodes=1 livenessize=0.00B
database=chaindata hash=310acd..806a06
```

```
nralavi@nralavi-virtual-machine:~/Desktop/ca2$ geth --identity "node01" --http --http.port "8546" --authrpc.port "8552" --http.corsdomain "*" --datadir "/home/nralavi/Desktop/ca2/node01" --port "30298" --nodiscover --http.api "eth,net,web3,personal,miner,admin" --networkid 1234 --nat "any" --allow-insecure-unlock --ipcdisable
INFO [05-26|11:35:29.677] Maximum peer count           ETH=>50 LI=>0 total=>50
INFO [05-26|11:35:29.678] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [05-26|11:35:29.681] Set global gas cap           cap=50,000,000
INFO [05-26|11:35:29.683] Allocated trie memory caches clean=154.00MiB dirty=256.00MiB
INFO [05-26|11:35:29.695] Using leveldb as the backing database database=/home/nralavi/Desktop/ca2/node01/geth/chaindata cache=512.00MiB handles=524,288
INFO [05-26|11:35:29.695] Allocated cache and file handles
INFO [05-26|11:35:29.707] Using levelDB as the backing database database=/home/nralavi/Desktop/ca2/node01/geth/chaindata/ancient/chain readonly=false
INFO [05-26|11:35:29.707] Opened ancient database
INFO [05-26|11:35:29.709] Disk storage enabled for ethash caches dir=/home/nralavi/Desktop/ca2/node01/geth/ethash count=3
INFO [05-26|11:35:29.709] Disk storage enabled for ethash DAGs dir=/home/nralavi/.ethash count=2
INFO [05-26|11:35:29.710] Initialising Ethereum protocol network=1234 dversion=<nll>
INFO [05-26|11:35:29.710]
-----
INFO [05-26|11:35:29.710] Chain ID: 15 (unknown)
INFO [05-26|11:35:29.710] Consensus: unknown
INFO [05-26|11:35:29.711] Pre-Merge hard forks (block based):
INFO [05-26|11:35:29.711] - Homestead: #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/homestead.md)
INFO [05-26|11:35:29.711] - Tangerine Whistle (EIP 150): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/tangerine-whistle.md)
INFO [05-26|11:35:29.711] - Spurious Dragon/1 (EIP 155): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [05-26|11:35:29.711] - Spurious Dragon/2 (EIP 158): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [05-26|11:35:29.711] - Byzantium: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/byzantium.md)
INFO [05-26|11:35:29.711] - Constantinople: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/constantinople.md)
INFO [05-26|11:35:29.711] - Petersburg: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/petersburg.md)
INFO [05-26|11:35:29.711] - Istanbul: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/istanbul.md)
INFO [05-26|11:35:29.711] - Berlin: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/berlin.md)
INFO [05-26|11:35:29.711] - London: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/london.md)
INFO [05-26|11:35:29.711] The Merge is not yet available for this network!
INFO [05-26|11:35:29.711] - Hard-fork specification: https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/paris.md
INFO [05-26|11:35:29.711] Post-Merge hard forks (timestamp based):
INFO [05-26|11:35:29.711]
-----
INFO [05-26|11:35:29.711] Loaded most recent local block number=0 hash=310acd...806a80 td=400,000 age=55y2m0w
WARN [05-26|11:35:29.712] Failed to load snapshot err="missing or corrupted snapshot"
INFO [05-26|11:35:29.712] Rebuilding state snapshot
INFO [05-26|11:35:29.713] Regenerated local transaction journal transactions=0 accounts=0
INFO [05-26|11:35:29.713] Resuming state snapshot generation root=c0aa80...01d07f accounts=0 slots=0 storage=0.00B dangling=0 elapsed=678.745µs
INFO [05-26|11:35:29.713] Generated state snapshot accounts=3 slots=0 storage=130.00B dangling=0 elapsed=1.060ms
INFO [05-26|11:35:29.713] Gasprice oracle is ignoring threshold set threshold=2
WARN [05-26|11:35:29.716] Error reading unclean shutdown markers error="leveldb: not found"
WARN [05-26|11:35:29.716] Engine API enabled protocol=eth
INFO [05-26|11:35:29.717] Engine API started but chain not configured for merge yet
INFO [05-26|11:35:29.725] New local node record instance=geth/node01/v1.11.6-stable-ea9e02ca/linux-and64/go1.20.3
INFO [05-26|11:35:29.725] Started P2P networking seq=1,716,710,729,723 id=c0ca070e3d54ecbb ip=127.0.0.1 udp=0 tcp=30298
INFO [05-26|11:35:29.725] Generated JWT secret self="enode://55e1220713340e1dd0b24c5eab534b0b3934b0b3e7609f2e7287cace2b73c2fb032751e002b5971a41972dde0aa2f3785112d04ed9229a6f39b4bd"
INFO [05-26|11:35:29.725] HTTP server started path=/home/nralavi/Desktop/ca2/node01/geth/jwtsecret
INFO [05-26|11:35:29.725] Websocket enabled endpoint=127.0.0.1:8546 auth=false prefix=cors* vhosts=localhost
INFO [05-26|11:35:29.725] HTTP server started urlws://127.0.0.1:8552
INFO [05-26|11:35:29.725] HTTP server started endpoint=127.0.0.1:8552 auth=true prefix=cors=localhost vhosts=localhost
```

```
--nodiscover --http.api "eth,net,web3,personal,miner,admin" --networkid 1234 --nat "any" --allow-insecure-unlock --ipcdisable
INFO [05-26|11:39:51.930] Maximum peer count           ETH=>50 LI=>0 total=>50
INFO [05-26|11:39:51.940] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [05-26|11:39:51.941] Set global gas cap           cap=50,000,000
INFO [05-26|11:39:51.941] Allocated trie memory caches clean=154.00MiB dirty=256.00MiB
INFO [05-26|11:39:51.941] Using leveldb as the backing database database=/home/nralavi/Desktop/ca2/node02/geth/chaindata cache=512.00MiB handles=524,288
INFO [05-26|11:39:51.945] Allocated cache and file handles
INFO [05-26|11:39:51.950] Using levelDB as the backing database database=/home/nralavi/Desktop/ca2/node02/geth/chaindata/ancient/chain readonly=false
INFO [05-26|11:39:51.950] Opened ancient database
INFO [05-26|11:39:51.951] Disk storage enabled for ethash caches dir=/home/nralavi/Desktop/ca2/node02/geth/ethash count=3
INFO [05-26|11:39:51.951] Disk storage enabled for ethash DAGs dir=/home/nralavi/.ethash count=2
INFO [05-26|11:39:51.951] Initialising Ethereum protocol network=1234 dversion=<nll>
INFO [05-26|11:39:51.952]
-----
INFO [05-26|11:39:51.952] Chain ID: 15 (unknown)
INFO [05-26|11:39:51.952] Consensus: unknown
INFO [05-26|11:39:51.952] Pre-Merge hard forks (block based):
INFO [05-26|11:39:51.952] - Homestead: #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/homestead.md)
INFO [05-26|11:39:51.952] - Tangerine Whistle (EIP 150): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/tangerine-whistle.md)
INFO [05-26|11:39:51.952] - Spurious Dragon/1 (EIP 155): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [05-26|11:39:51.952] - Spurious Dragon/2 (EIP 158): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [05-26|11:39:51.952] - Byzantium: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/byzantium.md)
INFO [05-26|11:39:51.952] - Constantinople: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/constantinople.md)
INFO [05-26|11:39:51.952] - Petersburg: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/petersburg.md)
INFO [05-26|11:39:51.952] - Istanbul: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/istanbul.md)
INFO [05-26|11:39:51.952] - Berlin: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/berlin.md)
INFO [05-26|11:39:51.952] - London: #<nll> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/london.md)
INFO [05-26|11:39:51.952] The Merge is not yet available for this network!
INFO [05-26|11:39:51.952] - Hard-fork specification: https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/paris.md
INFO [05-26|11:39:51.952] Post-Merge hard forks (timestamp based):
INFO [05-26|11:39:51.952]
-----
INFO [05-26|11:39:51.952] Loaded most recent local block number=0 hash=310acd...806a80 td=400,000 age=55y2m0w
WARN [05-26|11:39:51.952] Failed to load snapshot err="missing or corrupted snapshot"
INFO [05-26|11:39:51.952] Rebuilding state snapshot
INFO [05-26|11:39:51.953] Resuming state snapshot generation root=c0aa80...01d07f accounts=0 slots=0 storage=0.00B dangling=0 elapsed=299.974µs
INFO [05-26|11:39:51.953] Regenerated local transaction journal transactions=0 accounts=0
INFO [05-26|11:39:51.953] Generated state snapshot accounts=3 slots=0 storage=130.00B dangling=0 elapsed=722.970µs
INFO [05-26|11:39:51.953] Gasprice oracle is ignoring threshold set threshold=2
WARN [05-26|11:39:51.953] Error reading unclean shutdown markers error="leveldb: not found"
WARN [05-26|11:39:51.953] Engine API enabled protocol=eth
INFO [05-26|11:39:51.953] Engine API started but chain not configured for merge yet
INFO [05-26|11:39:51.953] Starting peer-to-peer node instance=geth/node02/v1.11.6-stable-ea9e02ca/linux-and64/go1.20.3
INFO [05-26|11:39:51.960] Generated JWT secret path=/home/nralavi/Desktop/ca2/node02/geth/jwtsecret
INFO [05-26|11:39:51.961] HTTP server started endpoint=127.0.0.1:8546 auth=false prefix=cors* vhosts=localhost
INFO [05-26|11:39:51.961] Websocket enabled urlws://127.0.0.1:8553
INFO [05-26|11:39:51.961] HTTP server started endpoint=127.0.0.1:8553 auth=true prefix=cors=localhost vhosts=localhost
INFO [05-26|11:39:51.961] New local node record seq=1,716,710,991,960 id=1ba380e60006f4e1 ip=127.0.0.1 udp=0 tcp=30299
INFO [05-26|11:39:51.961] Started P2P networking self="enode://d9b9517cbf735c0eb307a94c1dc49baf8605d291a777ba981bacc08bf729a4842a3c7aa9d58a73802b000e52996e50f8f90734e67b0e321347cc1b0e127.0.0.1:30299?discport=0"
```



```

-nodiscover --http.api "eth,net,web3,personal,miner,admin" --networkid 1234 --nat "any" --allow-insecure-unlock --ipcdisable
INFO [05-26|11:41:31.576] Maxmum peer count           err="stat /run/pcscd/pcscd.com: no such file or directory"
INFO [05-26|11:41:31.576] Smartcard socket not found, disabling
INFO [05-26|11:41:31.579] Set global gas cap          cap=50,000,000
INFO [05-26|11:41:31.580] Allocated trie memory caches        clean=154.00MiB dirty=256.00MiB
INFO [05-26|11:41:31.581] Using LevelDB as the backing database
INFO [05-26|11:41:31.581] Allocated cache and file handles   database=/home/mralavi/Desktop/ca2/node03/geth/chaindata cache=512.00MiB handles=524,288
INFO [05-26|11:41:31.589] Using LevelDB as the backing database
INFO [05-26|11:41:31.590] Opened ancient database            database=/home/mralavi/Desktop/ca2/node03/geth/chaindata/ancient/chain readonly=false
INFO [05-26|11:41:31.591] Disk storage enabled for ethash caches   dir=/home/mralavi/Desktop/ca2/node03/geth/ethash count=3
INFO [05-26|11:41:31.591] Initialising Ethereum protocol      dir=/home/mralavi/.ethash count=2
INFO [05-26|11:41:31.591]                                         network=1234 dbversion=entl
INFO [05-26|11:41:31.591]
-----
INFO [05-26|11:41:31.591] Chain ID: 15 (unknown)
INFO [05-26|11:41:31.591] Consensus: unknown
INFO [05-26|11:41:31.591]
Pre-Merge hard forks (block based):
INFO [05-26|11:41:31.591] - Homestead: #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/homestead.md)
INFO [05-26|11:41:31.591] - Tangerine Whistle (EIP 150): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/tangerine-whistle.md)
INFO [05-26|11:41:31.591] - Spurious Dragon/1 (EIP 155): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [05-26|11:41:31.591] - Spurious Dragon/2 (EIP 158): #0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [05-26|11:41:31.591] - Byzantium: #entl> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/byzantium.md)
INFO [05-26|11:41:31.591] - Constantinople: #entl> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/constantinople.md)
INFO [05-26|11:41:31.591] - Petersburg: #entl> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/petersburg.md)
INFO [05-26|11:41:31.591] - Istanbul: #entl> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/istanbul.md)
INFO [05-26|11:41:31.591] - Berlin: #entl> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/berlin.md)
INFO [05-26|11:41:31.591] - London: #entl> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/london.md)
INFO [05-26|11:41:31.591]
The Merge is not yet available for this network!
INFO [05-26|11:41:31.591] - Hard-fork specification: https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/paris.md
INFO [05-26|11:41:31.591]
Post-Merge hard forks (timestamp based):
INFO [05-26|11:41:31.591]
-----
INFO [05-26|11:41:31.592] Loaded most recent local block      number=0 hash=310acd..806a00 td=400,000 age=55y2m0w
WARN [05-26|11:41:31.592] Failed to load snapshot             err="missing or corrupted snapshot"
INFO [05-26|11:41:31.592] Rebuilding state snapshot
INFO [05-26|11:41:31.592] Resuming state snapshot generation root=c6aa0b..01d07f accounts=0 slots=0 storage=0.00B dangling=0 elapsed="138.345µs"
INFO [05-26|11:41:31.592] Generated state snapshot            accounts=3 slots=0 storage=138.00B dangling=0 elapsed="583.577µs"
INFO [05-26|11:41:31.592] Regenerated local transaction journal transactions=0 accounts=0
INFO [05-26|11:41:31.593] Gasprice oracle is ignoring threshold set threshold=2
WARN [05-26|11:41:31.593] Error reading unclean shutdown markers error="leveldb: not found"
WARN [05-26|11:41:31.593] Engine API enabled                  protocol=eth
WARN [05-26|11:41:31.593] Engine API started but chain not configured for merge yet
INFO [05-26|11:41:31.593] Starting peer-to-peer node          instance=Geth/node03/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
INFO [05-26|11:41:31.599] Generated JWT secret                path=/home/mralavi/Desktop/ca2/node03/geth/jwtsecret
INFO [05-26|11:41:31.599] HTTP server started                 endpoint=127.0.0.1:8548 auth=false prefix= cors= vhost=localhost
INFO [05-26|11:41:31.599] New local node record               seq=1,716,711,691,598 id=cfc6718b03ed77bab ip=127.0.0.1 udp=0 tcp=30300
INFO [05-26|11:41:31.599] Started P2P networking              self= enode://7ffde9d6f7818335a23e7415c5d84d53b0318ea35c531d1ff460deb3ef7bb539a5ae98d024607876da3ed705e7bfc0f0961860d3450ba8d5013
e38d9d127.0.0.1:30300/discport=0
INFO [05-26|11:41:31.600] WebSocket enabled                   url=ws://127.0.0.1:8554
INFO [05-26|11:41:31.600] HTTP server started                 endpoint=127.0.0.1:8554 auth=true prefix= cors=localhost vhost=localhost

```

```

mralavi@mralavi-virtual-machine: ~/Desktop/ca2
mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8546
WARN [05-26|12:19:48.504] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

Instance: Geth/node01/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node01
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
>

```

```

mralavi@mralavi-virtual-machine: ~/Desktop/ca2
WARN [05-26|12:19:48.504] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

Instance: Geth/node01/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node01
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> admin.nodeInfo
{
  enode: "enode://55e1220713340e1dd8b24c5eab534b0b03934b0b3e76609f2e7287cac62b73c2fb0327515e002b5971a419722de0aaa2f3785112d04ed9229a0f39b4bd24b678@127.0.0.1:30298?discport=0",
  enr: { "enr": "-Jy4QKu04Y8W59WdxjHdUyaqfLx5SHlCQeDY8w3TFemX3pDENIykyAgar6JKN-d6yqzE4wwO3X9GzJX41GFvLeblywSAY-z7uf7g2V0aMFCHZmRr2AgmIkgnY0gmLwhH8AAAGJc2VjCDI1NmsxoQJY45IHEzQOHdlyTF6rU08LASNLcZ52YJ8ucofKxitzwoRzbnFwFIW8Y3CCdlo",
    id: "cc8ac70e3d54ecbb791fb4975e8638176cd0d1449784e6572d5a80bc9a40606f",
    ip: "127.0.0.1",
    listenAddr: "[*]:30298",
    name: "geth/node01/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3",
    ports: {
      discovery: 0,
      listener: 30298
    },
    protocols: {
      eth: {
        config: {
          chainId: 15,
          eip150Block: 0,
          eip155Block: 0,
          eip158Block: 0,
          homesteadBlock: 0
        },
        difficulty: 400000,
        genesis: "0x310acdb25dee1aa918146c2aa1c97ee060bd5d1e88fad58c17d273716060a06",
        head: "0x310acdb25dee1aa918146c2aa1c97ee060bd5d1e88fad58c17d273716060a06",
        network: 1234
      },
      snap: {}
    }
  }
}

```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node02/" init/home/mralavi/Desktop/ca2/genesis.json
invalid command: "init/home/mralavi/Desktop/ca2/genesis.json"
mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node02/" init "/home/mralavi/Desktop/ca2/genesis.json"
INFO [05-26 11:20:31.039] Maximum peer count ETH=50 LEs=0 total=50
INFO [05-26 11:20:31.043] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [05-26 11:20:31.047] Set global gas cap cap=50,000,000
INFO [05-26 11:20:31.051] Using leveldb as the backing database database=/home/mralavi/Desktop/ca2/node02/geth/chaindata cache=16.00MiB handles=16
INFO [05-26 11:20:31.052] Allocated cache and file handles
INFO [05-26 11:20:31.066] Using LevelDB as the backing database database=/home/mralavi/Desktop/ca2/node02/geth/chaindata/ancient/chain readonly=false
INFO [05-26 11:20:31.082] Opened ancient database
INFO [05-26 11:20:31.082] Writing custom genesis block
Fatal: Failed to write genesis block: unsupported fork ordering: eip158block not enabled, but eip155block enabled at block 0
mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node02/" init "/home/mralavi/Desktop/ca2/genesis.json"
INFO [05-26 11:21:24.874] Maximum peer count ETH=50 LEs=0 total=50
INFO [05-26 11:21:24.875] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [05-26 11:21:24.879] Set global gas cap cap=50,000,000
INFO [05-26 11:21:24.880] Using leveldb as the backing database database=/home/mralavi/Desktop/ca2/node02/geth/chaindata cache=16.00MiB handles=16
INFO [05-26 11:21:24.880] Allocated cache and file handles database=/home/mralavi/Desktop/ca2/node02/geth/chaindata/ancient/chain readonly=false
INFO [05-26 11:21:24.885] Using LevelDB as the backing database
INFO [05-26 11:21:24.886] Opened ancient database
INFO [05-26 11:21:24.886] Writing custom genesis block
INFO [05-26 11:21:24.887] Persisted trie from memory database nodes=4 size=585.00B time="147.455µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [05-26 11:21:24.887] Successfully wrote genesis state database=chaindata hash=310acd..806a06
INFO [05-26 11:21:24.888] Using leveldb as the backing database database=/home/mralavi/Desktop/ca2/node02/geth/lightchaindata cache=16.00MiB handles=16
INFO [05-26 11:21:24.888] Allocated cache and file handles
INFO [05-26 11:21:24.891] Using LevelDB as the backing database database=/home/mralavi/Desktop/ca2/node02/geth/lightchaindata/ancient/chain readonly=false
INFO [05-26 11:21:24.894] Opened ancient database
INFO [05-26 11:21:24.894] Writing custom genesis block
INFO [05-26 11:21:24.894] Persisted trie from memory database nodes=4 size=585.00B time="44.107µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [05-26 11:21:24.895] Successfully wrote genesis state database=lightchaindata hash=310acd..806a06
mralavi@mralavi-virtual-machine:~/Desktop/ca2$
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth --datadir "/home/mralavi/Desktop/ca2/node03/" init "/home/mralavi/Desktop/ca2/genesis.json"
INFO [05-26 11:23:06.846] Maximum peer count ETH=50 LEs=0 total=50
INFO [05-26 11:23:06.848] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [05-26 11:23:06.851] Set global gas cap cap=50,000,000
INFO [05-26 11:23:06.853] Using leveldb as the backing database database=/home/mralavi/Desktop/ca2/node03/geth/chaindata cache=16.00MiB handles=16
INFO [05-26 11:23:06.853] Allocated cache and file handles database=/home/mralavi/Desktop/ca2/node03/geth/chaindata/ancient/chain readonly=false
INFO [05-26 11:23:06.856] Using LevelDB as the backing database
INFO [05-26 11:23:06.860] Opened ancient database
INFO [05-26 11:23:06.860] Writing custom genesis block
INFO [05-26 11:23:06.860] Persisted trie from memory database nodes=4 size=585.00B time="40.149µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [05-26 11:23:06.860] Successfully wrote genesis state database=chaindata hash=310acd..806a06
INFO [05-26 11:23:06.860] Using leveldb as the backing database database=/home/mralavi/Desktop/ca2/node03/geth/lightchaindata cache=16.00MiB handles=16
INFO [05-26 11:23:06.860] Allocated cache and file handles
INFO [05-26 11:23:06.862] Using LevelDB as the backing database database=/home/mralavi/Desktop/ca2/node03/geth/lightchaindata/ancient/chain readonly=false
INFO [05-26 11:23:06.866] Opened ancient database
INFO [05-26 11:23:06.866] Writing custom genesis block
INFO [05-26 11:23:06.866] Persisted trie from memory database nodes=4 size=585.00B time="55.299µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [05-26 11:23:06.866] Freezer shutting down
INFO [05-26 11:23:06.867] Successfully wrote genesis state database=lightchaindata hash=310acd..806a06
mralavi@mralavi-virtual-machine:~/Desktop/ca2$
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
    eip158Block: 0,
    homesteadBlock: 0
  },
  difficulty: 400000,
  genesis: "0x310acdb25dee1aa918146c62aa1c97ee060db5d1e88fad58c17d273716806a06",
  head: "0x310acdb25dee1aa918146c62aa1c97ee060db5d1e88fad58c17d273716806a06",
  network: 1234
},
snap: {}
}
> ^C
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8547
WARN [05-26 12:32:20.651] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node02/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node02
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> admin.addPeer("enode://55e1220713340e1dd8b24c5eab534b0b03934b0b3e76609f2e7287cac62b73c2fb0327515e002b5971a41972dde6aaa2f3785112d04ed9229a0f39b4bd24b678@127.0.0.1:30298?discoport=0")
true
>
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
8547
WARN [05-26|12:32:20.651] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node02/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node02
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> admin.addPeer("enode://55e1220713340e1dd8b24c5eab534b0b03934b0b3e76609f2e7287cac62b73c2fb0327515e002b5971a41972dde6aaa2f3785112d04ed9229a0f39b4bd24b678@127.0.0.1:30298?discport=0")
true
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:
8548
WARN [05-26|12:33:36.381] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node03/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node03
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> admin.addPeer("enode://55e1220713340e1dd8b24c5eab534b0b03934b0b3e76609f2e7287cac62b73c2fb0327515e002b5971a41972dde6aaa2f3785112d04ed9229a0f39b4bd24b678@127.0.0.1:30298?discport=0")
true
>
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
true
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:
8548
WARN [05-26|12:33:36.381] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node03/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node03
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> admin.addPeer("enode://55e1220713340e1dd8b24c5eab534b0b03934b0b3e76609f2e7287cac62b73c2fb0327515e002b5971a41972dde6aaa2f3785112d04ed9229a0f39b4bd24b678@127.0.0.1:30298?discport=0")
true
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:
8546
WARN [05-26|12:34:48.348] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node01/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node01
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> net.peerCount
2
>
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
7cac62b73c2fb0327515e002b5971a41972dde6aaa2f3785112d04ed9229a0f39b4bd24b678@127.0.0.1:30298?discport=0")
true
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:
8546
WARN [05-26|12:34:48.348] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node01/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node01
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> net.peerCount
2
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:
8547
WARN [05-26|12:35:37.890] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node02/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node02
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> net.peerCount
1
>
```

```

mralavi@mralavi-virtual-machine: ~/Desktop/ca2
To exit, press ctrl-d or type exit
> net.peerCount
1
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8547
WARN [05-26|12:35:37.890] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node02/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node02
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> net.peerCount
1
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8548
WARN [05-26|12:36:11.531] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node03/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node03
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> net.peerCount
1
>

```

```

mralavi@mralavi-virtual-machine: ~/Desktop/ca2
1
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8548
WARN [05-26|12:36:11.531] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node03/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node03
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> net.peerCount
1
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8546
WARN [05-26|12:37:05.858] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node01/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node01
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> eth.accounts
[ "0x54c3a4856eaf2c92bbb2d4ddf2155bebd8134d20" ]
> eth.getBalance(eth.accounts[0])
1000000000000000000000000
>

```

```

mralavi@mralavi-virtual-machine: ~/Desktop/ca2
Welcome to the Geth JavaScript console!

instance: Geth/node03/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node03
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> net.peerCount
1
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8546
WARN [05-26|12:37:05.858] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

instance: Geth/node01/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 0 (Thu Jan 01 1970 03:30:00 GMT+0330 (+0330))
datadir: /home/mralavi/Desktop/ca2/node01
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> eth.accounts
[ "0x54c3a4856eaf2c92bbb2d4ddf2155bebd8134d20" ]
> eth.getBalance(eth.accounts[0])
1000000000000000000000000
> personal.unlockAccount(eth.accounts[0])
Unlock account 0x54c3a4856eaf2c92bbb2d4ddf2155bebd8134d20
Passphrase:
true
>

```



```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
C668DE5B5dd", value:1000))
Error: authentication needed: password or unlock
    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
Error: authentication needed: password or unlock
    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
Error: authentication needed: password or unlock
    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> personal.unlockAccount(eth.accounts[0])

Unlock account 0x54c3a4856eaf2c92bbb2d4ddf2155bebd8134d20
Passphrase:
true
> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
"0xd1d7e3d131f5d45217cf00c43fd87968b72ecc1938517b95286872b1f5d7491a"
>
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2

    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
Error: authentication needed: password or unlock
    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
Error: authentication needed: password or unlock
    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> personal.unlockAccount(eth.accounts[0])

Unlock account 0x54c3a4856eaf2c92bbb2d4ddf2155bebd8134d20
Passphrase:
true
> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
"0xd1d7e3d131f5d45217cf00c43fd87968b72ecc1938517b95286872b1f5d7491a"
> miner.setEtherbase(eth.accounts[0])
true
>
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2

    at <eval>:1:20(12)

> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
Error: authentication needed: password or unlock
    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
Error: authentication needed: password or unlock
    at web3.js:6365:9(39)
    at send (web3.js:5099:62(29))
    at <eval>:1:20(12)

> personal.unlockAccount(eth.accounts[0])

Unlock account 0x54c3a4856eaf2c92bbb2d4ddf2155bebd8134d20
Passphrase:
true
> eth.sendTransaction({from:eth.accounts[0], to:"0x8849AB44426492496Ec4CCe80dC
C6C668DE5B5dd", value:1000})
"0xd1d7e3d131f5d45217cf00c43fd87968b72ecc1938517b95286872b1f5d7491a"
> miner.setEtherbase(eth.accounts[0])
true
> miner.start()
null
>
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
at <eval>:1:20(12)
> eth.sendTransaction({from:eth.accounts[0], to:"0xB849AB44426492496Ec4Cce80dcC6C68DE5B5dd", value:1000})
Error: authentication needed: password or unlock
  at web3.js:6365:9(39)
  at send (web3.js:5099:62(29))
  at <eval>:1:20(12)
> eth.sendTransaction({from:eth.accounts[0], to:"0xB849AB44426492496Ec4Cce80dcC6C68DE5B5dd", value:1000})
Error: authentication needed: password or unlock
  at web3.js:6365:9(39)
  at send (web3.js:5099:62(29))
  at <eval>:1:20(12)
> personal.unlockAccount(eth.accounts[0])
Unlock account 0x54c3a4856eaf2c92bb2d4ddf2155bebd8134d20
Passphrase:
true
> eth.sendTransaction({from:eth.accounts[0], to:"0xB849AB44426492496Ec4Cce80dcC6C68DE5B5dd", value:1000})
  0xd1d7e3d131f5d45217cf08c43f08b72ecc1938517b95286872b1f5d7491a"
  > miner.setEtherbase(eth.accounts[0])
true
  > miner.start()
null
  >
  >
```

ما ارسال کنی

بلاکچین

ما توسط یک همکاران جهت

استور زیر را

```
CA#2
CAR2.pdf
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
INFO [05-26|13:52:56.839] Generating DAG in progress epoch=0 percentage=70 elapse
d=55.234s
INFO [05-26|13:52:56.839] Generating DAG in progress epoch=0 percentage=71 elapse
d=56.419s
INFO [05-26|13:52:58.009] Generating DAG in progress epoch=0 percentage=72 elapse
d=57.589s
INFO [05-26|13:52:58.779] Generating DAG in progress epoch=0 percentage=73 elapse
d=58.358s
INFO [05-26|13:52:59.603] Generating DAG in progress epoch=0 percentage=74 elapse
d=59.917s
INFO [05-26|13:53:01.201] Generating DAG in progress epoch=0 percentage=75 elapse
d=1m0.780s
INFO [05-26|13:53:02.050] Generating DAG in progress epoch=0 percentage=76 elapse
d=1m1.629s
INFO [05-26|13:53:02.748] Generating DAG in progress epoch=0 percentage=77 elapse
d=1m2.327s
INFO [05-26|13:53:03.590] Generating DAG in progress epoch=0 percentage=78 elapse
d=1m3.170s
INFO [05-26|13:53:04.352] Generating DAG in progress epoch=0 percentage=79 elapse
d=1m3.932s
INFO [05-26|13:53:05.193] Generating DAG in progress epoch=0 percentage=80 elapse
d=1m4.773s
INFO [05-26|13:53:05.955] Generating DAG in progress epoch=0 percentage=81 elapse
d=1m5.535s
```

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
Error: authentication needed: password or unlock
  at web3.js:6365:9(30)
  at send (web3.js:5099:62(29))
  at <eval>:1:20(12)
> eth.sendTransaction({from:eth.accounts[0], to:"0xB849AB44426492496Ec4Cce80dcC6C68DE5B5dd", value:1000})
Error: authentication needed: password or unlock
  at web3.js:6365:9(39)
  at send (web3.js:5099:62(29))
  at <eval>:1:20(12)
> personal.unlockAccount(eth.accounts[0])
Unlock account 0x54c3a4856eaf2c92bb2d4ddf2155bebd8134d20
Passphrase:
true
> eth.sendTransaction({from:eth.accounts[0], to:"0xB849AB44426492496Ec4Cce80dcC6C68DE5B5dd", value:1000})
  0xd1d7e3d131f5d45217cf08c43f08b72ecc1938517b95286872b1f5d7491a"
  > miner.setEtherbase(eth.accounts[0])
true
  > miner.start()
null
  > miner.stop()
null
  > eth.getBalance(eth.accounts[0])
0x0000000000000000000000000000000000000000000000000000000000000000
```

عمل به یکدیگر

```
CA#2
CAR2.pdf
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
INFO [05-26|13:54:56.670] Generating DAG in progress epoch=1 percentage=88 elapse
d=1m34.297s
INFO [05-26|13:54:57.385] Generating DAG in progress epoch=1 percentage=89 elapse
d=1m35.012s
INFO [05-26|13:54:58.094] Generating DAG in progress epoch=1 percentage=90 elapse
d=1m35.721s
INFO [05-26|13:54:58.815] Generating DAG in progress epoch=1 percentage=91 elapse
d=1m36.442s
INFO [05-26|13:55:00.577] Generating DAG in progress epoch=1 percentage=92 elapse
d=1m38.204s
INFO [05-26|13:55:01.301] Generating DAG in progress epoch=1 percentage=93 elapse
d=1m38.929s
INFO [05-26|13:55:02.008] Generating DAG in progress epoch=1 percentage=94 elapse
d=1m39.636s
INFO [05-26|13:55:02.703] Generating DAG in progress epoch=1 percentage=95 elapse
d=1m40.331s
INFO [05-26|13:55:03.429] Generating DAG in progress epoch=1 percentage=96 elapse
d=1m41.057s
INFO [05-26|13:55:04.131] Generating DAG in progress epoch=1 percentage=97 elapse
d=1m41.758s
INFO [05-26|13:55:04.854] Generating DAG in progress epoch=1 percentage=98 elapse
d=1m42.482s
INFO [05-26|13:55:06.550] Generating DAG in progress epoch=1 percentage=99 elapse
d=1m44.177s
INFO [05-26|13:55:06.551] Generated ethash verification cache epoch=1 elapsed=1m44.179s
```

نام سیستم ایجاد تراکنش

```
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
null
> eth.getBalance(eth.accounts[0])
0x0000000000000000000000000000000000000000000000000000000000000000
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8547
WARN [05-26|13:55:33.766] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

Instance: Geth/node02/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 12 (Sun May 26 2024 13:54:04 GMT+0330)
datadir: /home/mralavi/Desktop/ca2/node02
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> eth.getBalance(eth.accounts[0])
0x0000000000000000000000000000000000000000000000000000000000000000
> mralavi@mralavi-virtual-machine:~/Desktop/ca2$ geth attach http://127.0.0.1:8548
WARN [05-26|13:55:58.516] Enabling deprecated personal namespace
Welcome to the Geth JavaScript console!

Instance: Geth/node03/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3
at block: 11 (Sun May 26 2024 13:53:59 GMT+0330)
datadir: /home/mralavi/Desktop/ca2/node03
modules: admin:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0

To exit, press ctrl-d or type exit
> eth.getBalance(eth.accounts[0])
0x0000000000000000000000000000000000000000000000000000000000000000
```

عمل به یکدیگر

```
CA#2
CAR2.pdf
mralavi@mralavi-virtual-machine: ~/Desktop/ca2
INFO [05-26|13:54:56.670] Generating DAG in progress epoch=1 percentage=88 elapse
d=1m34.297s
INFO [05-26|13:54:57.385] Generating DAG in progress epoch=1 percentage=89 elapse
d=1m35.012s
INFO [05-26|13:54:58.094] Generating DAG in progress epoch=1 percentage=90 elapse
d=1m35.721s
INFO [05-26|13:54:58.815] Generating DAG in progress epoch=1 percentage=91 elapse
d=1m36.442s
INFO [05-26|13:55:00.577] Generating DAG in progress epoch=1 percentage=92 elapse
d=1m38.204s
INFO [05-26|13:55:01.301] Generating DAG in progress epoch=1 percentage=93 elapse
d=1m38.929s
INFO [05-26|13:55:02.008] Generating DAG in progress epoch=1 percentage=94 elapse
d=1m39.636s
INFO [05-26|13:55:02.703] Generating DAG in progress epoch=1 percentage=95 elapse
d=1m40.331s
INFO [05-26|13:55:03.429] Generating DAG in progress epoch=1 percentage=96 elapse
d=1m41.057s
INFO [05-26|13:55:04.131] Generating DAG in progress epoch=1 percentage=97 elapse
d=1m41.758s
INFO [05-26|13:55:04.854] Generating DAG in progress epoch=1 percentage=98 elapse
d=1m42.482s
INFO [05-26|13:55:06.550] Generating DAG in progress epoch=1 percentage=99 elapse
d=1m44.177s
INFO [05-26|13:55:06.551] Generated ethash verification cache epoch=1 elapsed=1m44.179s
```

نام سیستم ایجاد تراکنش

### Question 1:

Every node works as a system and runs a client. They have the responsibility of storing and confirming the transactions. Nodes communicate with each other and store database of block chain.

Nodes in a cryptocurrency network play essential roles in maintaining the network's functionality, security, and decentralization.

### Full Node:

#### Functions:

**Store the Entire Blockchain:** Full nodes keep a complete copy of the blockchain, which includes all transactions and blocks from the network's inception. This comprehensive storage allows full nodes to independently verify the entire transaction history.

**Validate Transactions and Blocks:** Full nodes check each transaction and block against the network's consensus rules. This includes verifying digital signatures, ensuring no double-spending occurs, and confirming the correctness and order of new blocks.

**Propagate Transactions and Blocks:** Full nodes disseminate validated transactions and blocks to other nodes in the network. This propagation helps maintain the network's decentralization and ensures that all nodes have up-to-date information.

**Enforce Consensus Rules:** Full nodes play a critical role in enforcing the network's rules by rejecting invalid transactions and blocks. This enforcement maintains the integrity and security of the blockchain.

#### Advantages:

**High Security:** By independently validating transactions and blocks, full nodes contribute significantly to the network's trustworthiness and security.

**Network Stability:** Full nodes help maintain the network's stability by ensuring all participants follow the same rules.

#### Disadvantages:

**Resource Intensive:** Running a full node requires significant storage space, computational power, and bandwidth, which can be costly and resource-demanding.

### Light Node:

#### Functions:

**Store Partial Blockchain Data:** Light nodes store only a small portion of the blockchain, typically just the block headers, rather than the entire transaction history. This makes them much smaller and less resource-intensive.

**Request Data from Full Nodes:** Light nodes rely on full nodes to provide detailed transaction information. When a light node needs to verify a transaction, it requests the necessary data from full nodes.

**Validate Transactions Using Simplified Payment Verification (SPV):** Light nodes use SPV to verify transactions. They check the presence of a transaction in a block by verifying the block header and ensuring it is part of the longest chain, which is maintained by the full nodes.

**Advantages:**

**Lower Resource Requirements:** Light nodes require significantly less storage space, computational power, and bandwidth compared to full nodes, making them more accessible for average users and devices with limited resources.

**Ease of Use:** They are easier to set up and maintain, making them a more convenient option for users who do not need to run a full node.

**Disadvantages:**

**Dependence on Full Nodes:** Light nodes must trust full nodes for transaction verification, which can introduce security risks if the full nodes provide incorrect information.

**Limited Validation Capability:** Light nodes cannot independently verify the entire blockchain, limiting their ability to enforce all network rules.

**Question 2:**

**Successfully sealed new block:** This means that a suitable nonce has been found, and the block has been discovered. Note that this version of geth is working with PoW (Proof of Work). Additionally, other information such as the block number, block hash, and its fee are also included.

**block reached canonical chain:** This means that the block has been added to the canonical chain. The canonical chain is the main and valid chain.

**Question 3:**

Since the protocol is PoS (Proof of Stake), the power of individuals in the network is proportional to their holdings. Therefore, if someone wants to mine locally, they must first have enough money to mine a significant number of blocks. If they possess this much money, they will have a very high level of power and can effectively carry out this attack and even more



effective attacks. Additionally, this would cause all miners to lose their credibility because the previous chain would become invalidated, and they would never approve such an event.