

Build private network and test

Today we will build our own private network and test it is working well. However, we will use only 1 node for today. Let's try multi-node later.

Index

1. [Environment](#)
 2. [Build private network](#)
 3. [Test private network](#)
 4. [Make a transaction for testing private network](#)
-

Environment

- Linux mint 19.1 or Linux manjaro 19.0.0
- Go (version 1.10 or later)
- [geth-lecture branch](#) (go-ethereum)

Download and install geth

First clone geth from go-ethereum repository to `GOPATH` directory

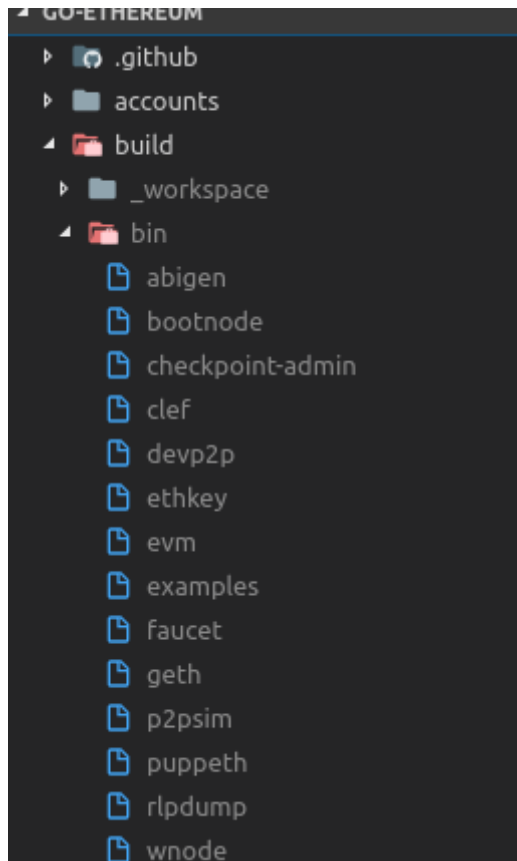
my `GOPATH` is `/home/hskim/go` so i cloned geth to `/home/hskim/go/src/github.com`

```
git clone -b lecture --single-branch https://github.com/HyoungsungKim/go-ethereum.git
```

Then geth will be downloaded. after downloading, move to `go-ethereum` directory and open terminal

```
make all
```

If build is successful then you can see `geth` in `/go-ethereum/build/bin`



Build private network

You can find `puppeth` which is located in same directory with `geth`. We will use it to make our own network. For our network, we have to make a `genesis` file first.

Run `puppeth` and follow the steps below

```
./puppeth
```

```
[hskim@hskim-pc bin]$ ./puppeth
```

```
+-----+
| Welcome to puppeth, your Ethereum private network manager |
|
| This tool lets you create a new Ethereum network down to |
| the genesis block, bootnodes, miners and ethstats servers |
| without the hassle that it would normally entail.         |
|
| Puppeth uses SSH to dial in to remote servers, and builds |
| its network components out of Docker containers using the |
| docker-compose toolset.                                   |
+-----+
```

Please specify a network name to administer (no spaces, hyphens or capital letters please)

```
> eccpow1
```

Sweet, you can set this via `--network=eccpow1` next time!

INFO [02-14|21:21:23.414] Administering Ethereum network

name=eccpow1

WARN [02-14|21:21:23.414] No previous configurations found

path=/home/hskim/.puppeth/eccpow1

What would you like to do? (default = stats)

1. Show network stats
2. Configure new genesis
3. Track new remote server
4. Deploy network components

> 2

What would you like to do? (default = create)

1. Create new genesis from scratch
2. Import already existing genesis

> 1

Which consensus engine to use? (default = clique)

1. Ethash - proof-of-work
2. Clique - proof-of-authority
3. EccPoW - proof-of-work with LDPC

> 3

Which accounts should be pre-funded? (advisable at least one)

> 0x

Should the precompile-addresses (0x1 .. 0xff) be pre-funded with 1 wei?
(advisable yes)

>

Specify your chain/network ID if you want an explicit one (default = random)

> 12345

INFO [02-14|21:21:58.917] Configured new genesis block

What would you like to do? (default = stats)

1. Show network stats
2. Manage existing genesis
3. Track new remote server
4. Deploy network components

> 2

1. Modify existing configurations
2. Export genesis configurations
3. Remove genesis configuration

> 2

Which folder to save the genesis specs into? (default = current)

Will create eccpow1.json, eccpow1-aleth.json, eccpow1-harmony.json, eccpow1-parity.json

>

INFO [02-14|21:22:02.800] Saved native genesis chain spec
path=eccpow1.json

ERROR[02-14|21:22:02.800] Failed to create Aleth chain spec
err="unsupported consensus engine"

ERROR[02-14|21:22:02.800] Failed to create Parity chain spec
err="unsupported consensus engine"

INFO [02-14|21:22:02.803] Saved genesis chain spec
client=harmony path=eccpow1-harmony.json

What would you like to do? (default = stats)

1. Show network stats
2. Manage existing genesis

```
3. Track new remote server
4. Deploy network components
> ^C
```

- `eccpow1` is name of genesis file
- `chainID` is 12345. You can change it, but you have to avoid already defined `chainID`
- You can exit using `ctrl + c`

`chainID` is the most important part of this `.json`. Because, geth can recognize a network using `chainID`. In ethereum network, There are already defined `chainID`. you can see more detail from [here](#)

```
0: Olympic; Ethereum public pre-release testnet
1: Frontier; Homestead, Metropolis, the Ethereum public main network
1: Classic; The (un)forked public Ethereum Classic main network, chain ID 61
1: Expanse; An alternative Ethereum implementation, chain ID 2
2: Morden; The public Ethereum testnet, now Ethereum Classic testnet
3: Ropsten; The public cross-client Ethereum testnet
4: Rinkeby; The public Geth Ethereum testnet
42: Kovan; The public Parity Ethereum testnet
77: Sokol; The public POA testnet
99: POA; The public Proof of Authority Ethereum network
7762959: Musicoin; The music blockchain
```

Except these, you can use any `chainID` like 12345 what i did.

Now we have to make a directory to store information. I made `geth-test` folder. You can make it anywhere. my directory is `/home/hskim/Documents/geth-test`

Finally, We are ready to start.

Move to `/go-ethereum/build/bin`, open terminal and follow it

```
(EXAMPLE) $ ./geth --datadir your_own_storage init genesis.json
```

For example, in my case

```
$ ./geth --datadir /home/hskim/Documents/geth-test init genesis.json
```

After initiation, check your own storage folder

```

INFO [08-06|20:49:41.266] Bumping default cache on mainnet      provided=1024
updated=4096
INFO [08-06|20:49:41.268] Maximum peer count                      ETH=50 LES=0
total=50
INFO [08-06|20:49:41.268] Smartcard socket not found, disabling  err="stat
/run/pcscd/pcscd.comm: no such file or directory"
INFO [08-06|20:49:41.271] Allocated cache and file handles
database=/home/hskim/Documents/geth-test/geth/chaindata cache=16.00MiB
handles=16
INFO [08-06|20:49:41.284] Writing custom genesis block
INFO [08-06|20:49:41.284] Persisted trie from memory database      nodes=0
size=0.00B time=3.725µs gcnodes=0 gcsiz=0.00B gctime=0s livenodes=1
livesize=0.00B
INFO [08-06|20:49:41.285] Successfully wrote genesis state
database=chaindata hash=ab944c...55600c
INFO [08-06|20:49:41.285] Allocated cache and file handles
database=/home/hskim/Documents/geth-test/geth/lightchaindata cache=16.00MiB
handles=16
INFO [08-06|20:49:41.302] Writing custom genesis block
INFO [08-06|20:49:41.302] Persisted trie from memory database      nodes=0
size=0.00B time=3.632µs gcnodes=0 gcsiz=0.00B gctime=0s livenodes=1
livesize=0.00B
INFO [08-06|20:49:41.303] Successfully wrote genesis state
database=lightchaindata hash=ab944c...55600c

```

If initiation is done well, then you can see `geth` and `keystore` folder in your storage

```

hskim@hskim-labPC:~/Documents/geth-test$ ls
geth  keystore
hskim@hskim-labPC:~/Documents/geth-test$ 

```

Now we can run our private network!

open terminal in `/go-ethereum/build/bin` and follow it!

```
(EXAMPLE) $ ./geth --datadir Your_own_storage --networkid 12345 console
```

We set the `chainid` as 12345 in `genesis.json` Therefore our `networkid` is 12345 too

In my case,

```
$ ./geth --datadir /home/hskim/Documents/geth-test --networkid 12345 console
```

then you can see

```

INFO [08-06|21:27:43.867] Maximum peer count                      ETH=50 LES=0
total=50
INFO [08-06|21:27:43.867] Smartcard socket not found, disabling  err="stat
/run/pcscd/pcscd.comm: no such file or directory"
INFO [08-06|21:27:43.870] Starting peer-to-peer node
instance=Geth/v1.9.2-unstable-aa6005b4-20190805/linux-amd64/go1.12.7
INFO [08-06|21:27:43.870] Allocated trie memory caches
clean=256.00MiB dirty=256.00MiB
INFO [08-06|21:27:43.870] Allocated cache and file handles
database=/home/hskim/Documents/geth-test/geth/chaindata cache=512.00MiB
handles=524288

```

```

INFO [08-06|21:27:43.904] Opened ancient database
database=/home/hskim/Documents/geth-test/geth/chaindata/ancient
INFO [08-06|21:27:43.904] Initialised chain configuration          config="
{ChainID: 12345 Homestead: 0 DAO: <nil> DAOSupport: false EIP150: <nil> EIP155:
0 EIP158: 0 Byzantium: <nil> Constantinople: <nil> Petersburg: <nil> Engine:
unknown}"
INFO [08-06|21:27:43.904] Disk storage enabled for ethash caches
dir=/home/hskim/Documents/geth-test/geth/ethash count=3
INFO [08-06|21:27:43.904] Disk storage enabled for ethash DAGs
dir=/home/hskim/.ethash count=2
INFO [08-06|21:27:43.904] Initialising Ethereum protocol          versions=[63]
network=12345 dbversion=7
INFO [08-06|21:27:43.944] Loaded most recent local header          number=0
hash=ab944c...55600c td=400 age=50y3mo3w
INFO [08-06|21:27:43.944] Loaded most recent local full block          number=0
hash=ab944c...55600c td=400 age=50y3mo3w
INFO [08-06|21:27:43.944] Loaded most recent local fast block          number=0
hash=ab944c...55600c td=400 age=50y3mo3w
INFO [08-06|21:27:43.945] Loaded local transaction journal
transactions=0 dropped=0
INFO [08-06|21:27:43.945] Regenerated local transaction journal
transactions=0 accounts=0
INFO [08-06|21:27:43.951] Allocated fast sync bloom
size=512.00MiB
INFO [08-06|21:27:43.951] Initialized fast sync bloom          items=0
errorrate=0.000 elapsed=37.353µs
INFO [08-06|21:27:43.997] New local node record          seq=3
id=65c5b16ab4aa9e9f ip=127.0.0.1 udp=30303 tcp=30303
INFO [08-06|21:27:43.998] Started P2P networking
self=enode://3e6e6cc9fd56954e02f3807813e086827ddf0576d0c969f67a915691ec3f8798673
32ba4911048fd513672856c63a2746063706005c6d777f670ae16c2c4a384@127.0.0.1:30303
INFO [08-06|21:27:43.999] IPC endpoint opened
url=/home/hskim/Documents/geth-test/geth.ipc
WARN [08-06|21:27:44.088] Served eth_coinbase          reqid=3
t=16.874µs err="etherbase must be explicitly specified"
Welcome to the Geth JavaScript console!

instance: Geth/v1.9.2-unstable-aa6005b4-20190805/linux-amd64/go1.12.7
at block: 0 (Thu, 01 Jan 1970 09:00:00 KST)
  datadir: /home/hskim/Documents/geth-test
  modules: admin:1.0 debug:1.0 eth:1.0 ethash:1.0 miner:1.0 net:1.0 personal:1.0
rpc:1.0 txpool:1.0 web3:1.0
>

```

At last line, you can see console pointer(>). there are some lines we need to check

```

INFO [08-06|21:27:43.904] Initialised chain configuration          config="
{ChainID: 12345 Homestead: 0 DAO: <nil> DAOSupport: false EIP150: <nil> EIP155:
0 EIP158: 0 Byzantium: <nil> Constantinople: <nil> Petersburg: <nil> Engine:
unknown}"

```

In this line, we can check ChainID is 12345 like we expected.

Now our private network is running!

Test private network

I added few lines of source code in miner/worker.go

```
csvFile, _ := os.OpenFile("elapsedTime.csv",
os.O_WRONLY|os.O_CREATE|os.O_APPEND, 0644)

wr := csv.NewWriter(csvFile)
wr.Write([]string{block.Number().String(),
time.Since(task.createdAt).String()})
wr.Flush()
```

This source will make `elapsedTime.csv` file in `/build/bin` directory(Same directory with `geth` and `puppeth`).

In this file, block generation time will be written by source code.

You can see a example in below

```
bin > cat elapsedTime.csv
1,2m53.376816683s
2,3m24.504237342s
3,13.263856555s
4,8m31.163773571s
5,2m44.392010422s
6,20.954342509s
7,16.689777863s
8,2m30.321406096s
9,1m10.962926158s
10,30.540573503s
11,33.057599785s
12,1m58.645488927s
13,6.896590058s
14,7.277946636s
15,54.713830512s
16,48.652636433s
17,23.869661848s
18,17.820637234s
19,1m46.669008174s
20,2.084908473s
21,3m11.355263005s
22,57.606880205s
23,53.83599345s
24,1m32.823558747s
25,2m29.062678122s
26,1m4.081755759s
27,35.218024349s
28,1m5.062164893s
29,2m39.459121053s
30,1m30.814675823s
31,46.110044936s
32,2m19.294585211s
33,18.911738324s
34,32.123730103s
35,2m35.168715041s
36,55.925210436s
37,31.496297306s
38,1m18.280018847s
39,11.195656134s
40,32.356941261s
41,5m44.604676436s
```

- 1, 2, ... ,41 is block height
- 2m53.376, 3m24.504... , 5m44.6046 is elapse time(block generation time)

Now let's test our private network

```
> eth.blockNumber
0
> eth.accounts
[]
```

`eth.blockNumber` check the number of blocks. We just generate this network. Therefore there is 0 block. `eth.account` check accounts of network. There are no accounts.

Let's generate account

```
> personal.newAccount("Alice")
INFO [08-06|21:33:36.241] Your new key was generated
address=0xb8C941069cC2B71B1a00dB15E6E00A200d387039
WARN [08-06|21:33:36.241] Please backup your key file!
path=/home/hskim/Documents/geth-test/keystore/UTC--2019-08-06T12-33-34.442823142Z--b8c941069cc2b71b1a00db15e6e00a200d387039
WARN [08-06|21:33:36.241] Please remember your password!
"0xb8c941069cc2b71b1a00db15e6e00a200d387039"
```

We just generated the address of Alice: `0xb8C941069cC2B71B1a00dB15E6E00A200d387039`. We can see it by using `geth`

```
> eth.accounts
["0xb8c941069cc2b71b1a00db15e6e00a200d387039"]
```

we will use it as miner's address so block generation reward will be sent to Alice's address

Before mining, let's check Alice's balance

```
> eth.getBalance("0xb8c941069cc2b71b1a00db15e6e00a200d387039")
0
> eth.getBalance(eth.accounts[0])
0
```

There are 2 ways to check balance.

```
- First, using address directly
- Second, using random access of `eth.accounts`. Alice's account is first
  account of our network. so we can call it as `eth.account[0]`
```

I will use first one in this example to avoid confusion.

As we expect, there is no ether. Let's do mining.

First we have to set miner's address

We will use 3 commands

- `miner.setEtherbase(address)`
 - It sets miner's address. Mining reward will be sent to this account
- `miner.start(number of threads)`
 - Start mining. You can set how many threads you will use. I will use 1 thread
 - If your CPU has enough core, you can use higher number. It will be faster.
- `miner.stop()`

- Stop mining

```
> miner.setEtherbase("0xb8c941069cc2b71b1a00db15e6e00a200d387039")
true
> miner.start(1)
null
INFO [08-06|21:42:38.198] Updated mining threads                threads=1
INFO [08-06|21:42:38.198] Transaction pool price threshold updated
price=10000000000
null
> INFO [08-06|21:42:38.198] Commit new mining work                number=1
sealhash=4bb421...3f463a uncles=0 txs=0 gas=0 fees=0 elapsed=325.066µs
INFO [08-06|21:42:40.752] Successfully sealed new block                number=1
sealhash=4bb421...3f463a hash=4b2b78...4808f6 elapsed=2.554s
INFO [08-06|21:42:40.752] ⚡ mined potential block                number=1
hash=4b2b78...4808f6

.
.
.

INFO [08-06|21:42:56.174] ⚡ mined potential block                number=9
hash=2faebb...8be693
INFO [08-06|21:42:56.174] Commit new mining work                number=10
sealhash=384aa6...cb0596 uncles=0 txs=0 gas=0 fees=0 elapsed=179.463µs
> miner.stop()
null
```

We finished mining. Now let's check it worked well.

```
> eth.blockNumber
9
```

In my case, I mined 9 blocks until I stop it.

```
> eth.getBalance("0xb8c941069cc2b71b1a00db15e6e00a200d387039")
45000000000000000000
```

Wow! we got a reward. Exactly **wei**, not **ether**. wei is small unit of ether like satoshi of bitcoin

```
1 ether = 10^18 wei
```

We can convert it to ether by command

```
> web3.fromWei(eth.getBalance("0xb8c941069cc2b71b1a00db15e6e00a200d387039"),
"ether")
45
```

Yeah! we got 45 ether. But why 45 ether? To know it, we have to see the source code of geth(go-ethereum)

```
//go-ethereum/consensus/ethash/consensus.go
func accumulateRewards(config *params.ChainConfig, state *state.StateDB, header
*types.Header, uncles []*types.Header) {
```

```

// Select the correct block reward based on chain progression
blockReward := FrontierBlockReward
if config.IsByzantium(header.Number) {
    blockReward = ByzantiumBlockReward
}
if config.IsConstantinople(header.Number) {
    blockReward = ConstantinopleBlockReward
}
// Accumulate the rewards for the miner and any included uncles
reward := new(big.Int).Set(blockReward)
r := new(big.Int)
for _, uncle := range uncles {
    r.Add(uncle.Number, big8)
    r.Sub(r, header.Number)
    r.Mul(r, blockReward)
    r.Div(r, big8)
    state.AddBalance(uncle.Coinbase, r)

    r.Div(blockReward, big32)
    reward.Add(reward, r)
}
state.AddBalance(header.Coinbase, reward)
}

```

In this function, `blockReward` is initialized as `FrontierBlockReward`.

Let's see what is `FrontierBlockReward`

```

//go-ethereum/consensus/ethash/consensus.go
var (
    FrontierBlockReward      = big.NewInt(5e+18) // Block reward in wei for
successfully mining a block
    ByzantiumBlockReward     = big.NewInt(3e+18) // Block reward in wei for
successfully mining a block upward from Byzantium
    ConstantinopleBlockReward = big.NewInt(2e+18) // Block reward in wei for
successfully mining a block upward from Constantinople
    maxUncles                = 2                // Maximum number of uncles
allowed in a single block
    allowedFutureBlockTime   = 15 * time.Second // Max time from current time
allowed for blocks, before they're considered future blocks
    .
    .
    .
)

```

`FrontierBlockReward` is set as $5 * 10^{18}$ and it is 5 ether. Alice generated 9 blocks and got 5 ether per generation. Therefore Alice got 45 ether.

Make a transaction for testing private network

Generate new account

```
> personal.newAccount("Bob")
INFO [08-06|22:00:23.416] Your new key was generated
address=0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90
WARN [08-06|22:00:23.416] Please backup your key file!
path=/home/hskim/Documents/geth-test/keystore/UTC--2019-08-06T13-00-
21.621172635Z--f39cf42cd233261cd2b45adf8fb1e5a1e61a6f90
WARN [08-06|22:00:23.416] Please remember your password!
"0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90"

> eth.getBalance("0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90")
0
```

I got the account of BOB: `0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90` Alice will send ether to Bob's account

```
> eth.sendTransaction({from: "0xb8c941069cc2b71b1a00db15e6e00a200d387039", to:
"0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90", value: web3.toWei(5, "ether")})
```

Let's send 5 ether to Bob's account

- Alice's account : `0xb8c941069cc2b71b1a00db15e6e00a200d387039`
- Bob's account : `0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90`

Or we can initialize these using variable

```
> from = "0xb8c941069cc2b71b1a00db15e6e00a200d387039"
> to = "0xb8c941069cc2b71b1a00db15e6e00a200d387039"
> eth.sendTransaction({from: from, to: to, value: web3.toWei(5, "ether")})
```

We sent ether, however, ***don't forget we never use private key of Alice.*** Therefore we met Error

```
WARN [08-06|22:04:55.407] Served eth_sendTransaction          reqid=25
t=3.461656ms err="authentication needed: password or unlock"
Error: authentication needed: password or unlock
    at web3.js:3143:20
    at web3.js:6347:15
    at web3.js:5081:36
    at <anonymous>:1:1
```

We have to unlock Alice's account. Let's see status of Alice's account.

```
> personal.listWallets[0].status
"Locked"
```

Yes... It is locked... So we have to unlock it to send ether from Alice to Bob

```
> web3.personal.unlockAccount("0xb8c941069cc2b71b1a00db15e6e00a200d387039")
Unlock account 0xb8c941069cc2b71b1a00db15e6e00a200d387039
```

Alice's address is `0xb8c941069cc2b71b1a00db15e6e00a200d387039`. However we have to type a `Passphrase` of Alice. `passphrase` is `Alice` cause we generate this address using `Alice`

Remember it!

```
> personal.newAccount("Alice")
```

```
Passphrase: Alice  
true
```

Now Alice's account is unlocked. Let's go back to transaction. We can see pending transactions

```
> eth.pendingTransactions  
[]
```

Until now, there is not any transaction. We just unlocked Alice's account. Let's make a transaction again.

```
> eth.sendTransaction({from: "0xb8c941069cc2b71b1a00db15e6e00a200d387039", to:  
"0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90", value: web3.toWei(5, "ether")})  
INFO [08-06|22:16:09.274] Setting new local account  
address=0xb8C941069cC2B71B1a00dB15E6E00A200d387039  
INFO [08-06|22:16:09.275] Submitted transaction  
fullhash=0x926f1bb71d5b48a306e6cde2d45c01f8af2107febf94b166a7e5f8e025dc8adc  
recipient=0xf39Cf42Cd233261cd2b45ADf8fb1E5A1e61A6f90  
"0x926f1bb71d5b48a306e6cde2d45c01f8af2107febf94b166a7e5f8e025dc8adc"
```

There is no error. Let's see pending transactions

```
> eth.pendingTransactions  
[  
  {  
    blockHash: null,  
    blockNumber: null,  
    from: "0xb8c941069cc2b71b1a00db15e6e00a200d387039",  
    gas: 21000,  
    gasPrice: 10000000000,  
    hash: "0x926f1bb71d5b48a306e6cde2d45c01f8af2107febf94b166a7e5f8e025dc8adc",  
    input: "0x",  
    nonce: 0,  
    r: "0x70484271bdc85f7233e715423d8d0be5c669a323385b5ec0ff080a52cf3c654c",  
    s: "0x1b55a792995f61128c10a48ce1e0869893c863d38489f574d84ae3a96b031cef",  
    to: "0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90",  
    transactionIndex: null,  
    v: "0x42",  
    value: 50000000000000000000  
  }  
]
```

Yeah! There is a transaction.

```
> eth.getBalance("0xb8c941069cc2b71b1a00db15e6e00a200d387039")  
45000000000000000000  
> eth.getBalance("0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90")  
0
```

We didn't mine any block. so There is no change of balance yet. Let's mine again!

```
> miner.start(1)  
INFO [08-06|22:19:53.061] Updated mining threads  
threads=1
```

```

INFO [08-06|22:19:53.061] Transaction pool price threshold updated
price=10000000000
null
> INFO [08-06|22:19:53.062] Commit new mining work          number=10
sealhash=f69cfb...273c0d uncles=0 txs=0 gas=0 fees=0 elapsed=265.557µs
INFO [08-06|22:19:53.062] Commit new mining work          number=10
sealhash=a018f5...65f494 uncles=0 txs=1 gas=21000 fees=2.1e-05 elapsed=1.022ms
INFO [08-06|22:19:54.718] Successfully sealed new block          number=10
sealhash=a018f5...

.
.
.

INFO [08-06|22:20:05.086] ⚡ mined potential block          number=16
hash=e7688a...09ed64
INFO [08-06|22:20:05.086] Commit new mining work          number=17
sealhash=6b297d...b76b19 uncles=0 txs=0 gas=0      fees=0      elapsed=252.945µs
> miner.stop()
null

```

```

> eth.blockNumber
16

```

Last time Alice mined 9 blocks and this time mined 7 blocks more. So We can expect Alice has 75 ether (80 ether block reward - 5 ether sent to Bob = 75 ether). Let's check.

First,

```

> eth.pendingTransactions
[]

```

There is no pending transaction. Alice and Bob's transaction is done!

Let's see balance of them

```

> eth.getBalance("0xb8c941069cc2b71b1a00db15e6e00a200d387039")
75000000000000000000
> eth.getBalance("0xf39cf42cd233261cd2b45adf8fb1e5a1e61a6f90")
50000000000000000000

```

As we expected, Alice has 75 ether, Bob has 5 ether. We did it!

If there are errors or you want to add more details, please contribute it

Github : <https://github.com/HyoungsungKim/Studying-ethereum/tree/master/study-in-geth/docs>