

Ethereum



for noobs

go-ethereum codebase

Hội anh em blockchain "thiện lành"

Quoc Phu

 phu.kq

 phukq@blockchainlabs.asia



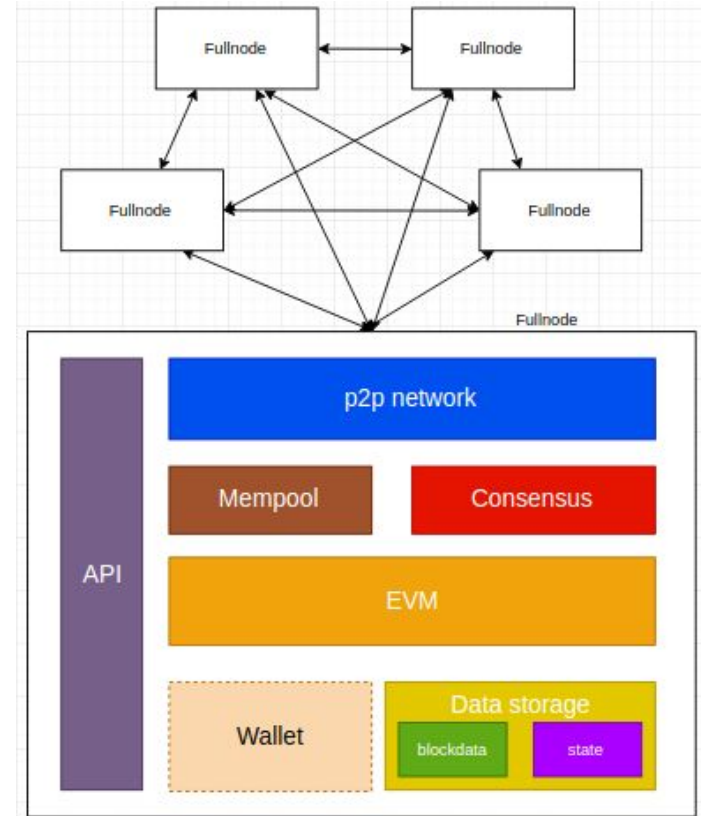
- +7 years experience as software developer.
- +3 years working in blockchain area.
- Enterprise Architecture team at IBL.

Contents

- Project structure.
- Building & modifying source code.
- Running a local network.

Components

- **p2p network:** Responsible for the propagation of transactions & other messages.
- **Mempool:** Responsible for storing unconfirmed transactions.
- **Consensus:** Running consensus protocol.
- **EVM:** Processing transaction, maintain state.
- **Data storage:** Storing all data of blockchain.
- **Api:** Providing api services: rpc, ipc, ws
- **Wallet:** Responsible for key management.



go-ethereum codebase

<https://github.com/ethereum/go-ethereum>

maintained by ETHDEV organisation



ethereum / go-ethereum

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Official Go implementation of the Ethereum protocol <https://geth.ethereum.org>

go blockchain ethereum p2p geth

11,024 commits 19 branches 151 releases 410 contributors LGPL-3.0

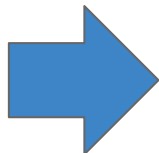
Branch: master New pull request Create new file Upload files Find File Clone or download

karalabe Merge pull request #19732 from karalabe/simulated-eip155 Latest commit 96f8be3 yesterday

.github	github: update code owners (#19638)	20 days ago
accounts	accounts/abi/bind/backends: use EIP155 on the simulated chain	yesterday
build	swarm: code cleanup, move to ethersphere/swarm (#19661)	15 days ago

Source code structure

```
accounts
appveyor.yml
AUTHORS
build
circle.yml
cmd
common
consensus
console
containers
contracts
COPYING
COPYING.LESSER
core
crypto
dashboard
Dockerfile
Dockerfile.alltools
eth
ethclient
ethdb
ethstats
event
interfaces.go
internal
les
light
log
Makefile
metrics
miner
mobile
node
p2p
params
README.md
rlp
rpc
signer
swarm
tests
trie
vendor
VERSION
whisper
```



```
cmd/
├── abigen
├── bootnode
├── clef
├── ethkey
├── evm
├── faucet
├── geth
├── internal
├── p2psim
├── puppeth
├── rlpdump
├── swarm
├── utils
└── wnode
```

```
consensus/
├── clique
├── consensus.go
├── errors.go
├── ethash
└── misc
```

```
./miner/
├── miner.go
├── stress_clique.go
├── stress_ethash.go
├── unconfirmed.go
├── unconfirmed_test.go
├── worker.go
└── worker_test.go
```

```
eth/
├── api_backend.go
├── api.go
├── api_test.go
├── api_tracer.go
├── backend.go
├── bloombits.go
├── config.go
├── downloader
├── fetcher
├── filters
├── gasprice
├── gen_config.go
├── handler.go
├── handler_test.go
├── helper_test.go
├── metrics.go
├── peer.go
├── protocol.go
├── protocol_test.go
├── sync.go
├── sync_test.go
└── tracers
```

```
core/
├── asm
├── bench_test.go
├── blockchain.go
├── blockchain_insert.go
├── blockchain_test.go
├── blocks.go
├── block_validator.go
├── block_validator_test.go
├── bloombits
├── chain_indexer.go
├── chain_indexer_test.go
├── chain_makers.go
├── chain_makers_test.go
├── dao_test.go
├── error.go
├── events.go
├── evm.go
├── gaspool.go
├── genesis_alloc.go
├── genesis.go
├── genesis_test.go
├── gen_genesis_account.go
├── gen_genesis.go
├── headerchain.go
├── helper_test.go
├── mkalloc.go
├── rawdb
├── state
├── state_processor.go
├── state_transition.go
├── tx_cacher.go
├── tx_journal.go
├── tx_list.go
├── tx_list_test.go
├── tx_pool.go
├── tx_pool_test.go
├── types
├── types.go
└── vm
```

Source code structure

```
Welcome to the Geth JavaScript console!

instance: Geth/v1.8.27-stable/linux-amd64/go1.12.3
coinbase: 0x4678fd8728fdbfda10dc2cdf46f5efe30e7ab9b4
at block: 1018 (Thu, 20 Jun 2019 10:41:20 +07)
datadir: /home/phu/Documents/Code/go/src/github.com/ethereum/go-ethereum
modules: admin:1.0 clique:1.0 debug:1.0 eth:1.0 miner:1.0

> eth.getBalance(eth.accounts[0])
9.0462569716653277674664832038037428010367175520031690
> eth.getTransactionCount(eth.accounts[0])
0
> var x = 10;
```



- Javascript runtime & interpreter: github.com/robertkrimen/otto
- Console: github.com/peterh/liner
- Command: github.com/urfave/cli
- Database: github.com/syndtr/golevel
- ...

How to start?

Get the source code from github & put it in \$GOPATH dir

```
git clone https://github.com/ethereum/go-ethereum.git  
$GOPATH/src/github.com/ethereum/go-ethereum
```

Compile the source code

```
make all
```

```
ls build/bin/  
abigen      ethkey      faucet      mimegen     rlpdump     swarm-smoke  
bootnode    evm         geth         p2psim      simulations  swarm-snapshot  
clef        examples    global-store puppeth     swarm        wnode
```


How to start?

File: `$GOPATH/src/github.com/ethereum/go-ethereum/cmd/geth/main.go`

```
255 func main() {  
256     fmt.Println("Welcome to 'Hội anh em blockchain thiện lành tại IBL'")  
257     if err := app.Run(os.Args); err != nil {  
258         fmt.Fprintln(os.Stderr, err)  
259         os.Exit(1)  
260     }  
261 }
```

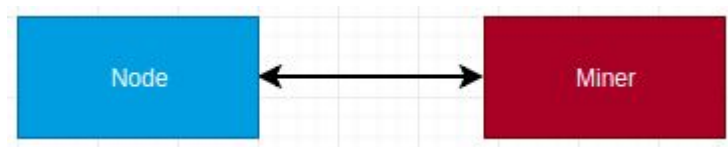
Build: `make geth`

```
phu@phu-Latitude-E5450:~/Documents/Code/go/src/github.com/ethereum/go-ethereum$ make geth  
build/env.sh go run build/ci.go install ./cmd/geth  
>>> /usr/local/go/bin/go install -v ./cmd/geth  
github.com/ethereum/go-ethereum/cmd/geth  
Done building.
```

Run: `./geth`

```
Welcome to 'Hội anh em blockchain thiện lành tại IBL'  
INFO [06-20|11:00:21.301] Maximum peer count                      ETH=25 LES=0 total=25  
WARN [06-20|11:00:21.303] Found deprecated node list file /home/phu/Documents/Code/go/src/github.com/eth  
INFO [06-20|11:00:21.303] Starting peer-to-peer node              instance=Geth/v1.8.27-stable/linux-am  
INFO [06-20|11:00:21.303] Allocated cache and file handles        database=/home/phu/Documents/Code/go/  
INFO [06-20|11:00:21.341] Initialised chain configuration          config="{ChainID: 2206 Homestead: 1 D  
ue}"
```

Create a local network



Using puppeth to create config file.

```
./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)
> ethnoob
Sweet, you can set this via --network=ethnoob next time!

INFO [06-19|17:38:08.897] Administering Ethereum network      name=ethnoob
```

Create a local network

Using puppeth to create config file.

```
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
> 2

How many seconds should blocks take? (default = 15)
> 5

Which accounts are allowed to seal? (mandatory at least one)
> 0x4678fd8728fdbfd10dc2cdf46f5efe30e7ab9b4
> 0x

Which accounts should be pre-funded? (advisable at least one)
> 0x4678fd8728fdbfd10dc2cdf46f5efe30e7ab9b4
> 0x

Should the precompile-addresses (0x1 .. 0xff) be pre-funded with 1 wei? (advisable yes)
> no
```

Create a local network

Using puppeth to create config file.

```
Specify your chain/network ID if you want an explicit one (default = random)
> 2206
INFO [06-19|17:39:00.079] 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 fork rules
 2. Export genesis configurations
 3. Remove genesis configuration
> 2 ←

Which folder to save the genesis specs into? (default = current)
Will create ethnoob.json, ethnoob-aleth.json, ethnoob-harmony.json, ethnoob-parity.json
>
INFO [06-19|17:39:16.997] Saved native genesis chain spec      path=ethnoob.json
ERROR[06-19|17:39:16.997] Failed to create Aleth chain spec    err="unsupported consensus engine"
ERROR[06-19|17:39:16.997] Failed to create Parity chain spec   err="unsupported consensus engine"
INFO [06-19|17:39:16.997] Saved genesis chain spec             client=harmony path=ethnoob-harmony.json
```

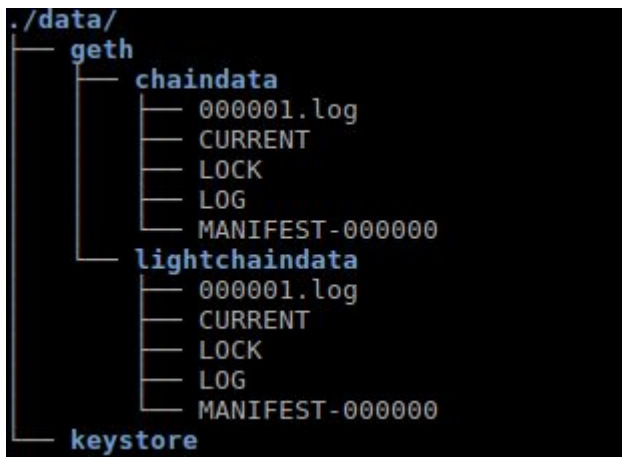
Create a local network

Using puppeteth to create config file.

[illegible]

Create a local network

Init data: `./geth init --datadir ./data ./ethnoob.json`



Create a local network

- Create a file acc.txt that contents a private key:
"cc6d94090069d54bf9169a40312792e7ce5f09672bd640e5c2e3ef565771a97d"
- Import account: `./geth --datadir ./data account import ./acc.txt`

```
phd@phd-Latitude-E5450: ~/Documents/code/go/src/github.com/ethereum/go-ethereum/build/bin$ ./geth
INFO [06-19|18:03:36.549] Maximum peer count               ETH=25 LES=0 total=25
Your new account is locked with a password. Please give a password. Do not forget this password.
Passphrase:
Repeat passphrase:
Address: {4678fd8728fdbfda10dc2cdf46f5efe30e7ab9b4}
```

- Create a file
pwd.txt that
contents password
which we've
recently input.

```
├─ acc.txt
├─ data
│  └─ geth
│     └─ keystore
│        └─ UTC--2019-06-19T11-03-43.326781423Z--4678fd8728fdbfda10dc2cdf46f5efe30e7ab9b4
├─ geth
└─ pwd.txt
```

Create a local network

Start miner:

```
./geth --networkid 2206 --datadir "./data" --nodiscover --rpc --rpccorsdomain "*"
--rpcapi eth,net,web3,personal,clique,miner,admin,debug,txpool --unlock
'0x4678fd8728fdbfda10dc2cdf46f5efe30e7ab9b4' --password ./pwd.txt --mine
```

```
INFO [06-19|18:12:06.464] Maximum peer count
INFO [06-19|18:12:06.465] Starting peer-to-peer node
INFO [06-19|18:12:06.465] Allocated cache and file handles
INFO [06-19|18:12:06.485] Initialised chain configuration
INFO [06-19|18:12:06.485] Initialising Ethereum protocol
INFO [06-19|18:12:06.555] Loaded most recent local header
INFO [06-19|18:12:06.555] Loaded most recent local full block
INFO [06-19|18:12:06.555] Loaded most recent local fast block
INFO [06-19|18:12:06.555] Loaded local transaction journal
INFO [06-19|18:12:06.555] Regenerated local transaction journal
INFO [06-19|18:12:06.592] New local node record
INFO [06-19|18:12:06.592] Started P2P networking
INFO [06-19|18:12:06.594] IPC endpoint opened
INFO [06-19|18:12:06.596] HTTP endpoint opened
INFO [06-19|18:12:07.527] Unlocked account
INFO [06-19|18:12:07.527] Transaction pool price threshold updated
INFO [06-19|18:12:07.527] Transaction pool price threshold updated
INFO [06-19|18:12:07.527] Etherbase automatically configured
INFO [06-19|18:12:07.527] Commit new mining work
INFO [06-19|18:12:07.528] Successfully sealed new block
INFO [06-19|18:12:07.528] ^mined potential block
INFO [06-19|18:12:07.529] Commit new mining work

ETH=25 LES=0 total=25
instance=Geth/v1.8.27-stable/linux-amd64/go1.12.3
database=/home/phu/Documents/Code/go/src/github.com/ethereum/go-ethereum/build/bin/data/geth/chaindata cache=512 handles=524288
config="{ChainID: 2206 Homestead: 1 DAO: <nil> DAOsupport: false EIP150: 2 EIP155: 3 EIP158: 3 Byzantium: 4 Constantinople: 5 ConstantinopleFix: <nil> Engine:
}"
versions="[63 62]" network=2206
number=0 hash=27137e..cd15ca td=1 age=33m51s
number=0 hash=27137e..cd15ca td=1 age=33m51s
number=0 hash=27137e..cd15ca td=1 age=33m51s
transactions=0 dropped=0
transactions=0 accounts=0
seq=2 id=89a31cc40af80543 ip=127.0.0.1 udp=0 tcp=30303
self="enode://ecf1f37c73190179e55b0ed25e5e39754e4e48140af95924356c472e70331dcd7d692a4b203b9a66077cc5ba1cfff23323b4550b6c48eea85d2c302d8aaef51d@127.0.0.1:30303?
url=/home/phu/Documents/Code/go/src/github.com/ethereum/go-ethereum/build/bin/data/geth.ipc
url=http://127.0.0.1:8545
address=0x4678fd8728fdbfda10dc2cdf46f5efe30e7ab9b4 cors=* vhosts=localhost
price=1000000000
price=1000000000
address=0x4678fd8728fdbfda10dc2cdf46f5efe30e7ab9b4
number=1 sealhash=d6d7d8..007d48 uncles=0 txs=0 gas=0 fees=0 elapsed=109.462µs
number=1 sealhash=d6d7d8..007d48 hash=5e1037..d725a1 elapsed=630.53µs
number=1 hash=5e1037..d725a1
number=2 sealhash=4c65ed..2f898c uncles=0 txs=0 gas=0 fees=0 elapsed=373.423µs
```

enode://ecf1f37c73190179e55b0ed25e5e39754e4e48140af95924356c472e70331dcd7d692a
4b203b9a66077cc5ba1cfff23323b4550b6c48eea85d2c302d8aaef51d@127.0.0.1:30303

Create a local network

Connect to the local network

- Init data: `./geth init --datadir ./data ./ethnoob.json`
- Create a file: `./data/geth/static-nodes.json` that contents id of the miner
enode://ecf1f37c73190179e55b0ed25e5e39754e4e48140af95924356c472e70331dcd7d692a4b203b9a66077cc5ba1cfff23323b4550b6c48eea85d2c302d8aaef51d@127.0.0.1:30303
- Start new node:
`./geth --networkid 2206 --datadir "./data" --nodiscover --rpc --rpccorsdomain "*" --rpcport 8548 --port 30304 --rpcapi "eth,net,web3,personal,clique,miner,admin,debug,txpool"`

```
INFO [06-20|09:30:14.481] Started P2P networking                self="enode://8a2d7c3a0857daa3a9900755626c7678fd6bacf22acfaafabef3053dbbf6e6844280d6956290a51  
ort=0"  
INFO [06-20|09:30:14.482] IPC endpoint opened                   url=/home/phu/Documents/Code/go/src/github.com/ethereum/go-ethereum/build/bin/data/geth.ipc  
INFO [06-20|09:30:14.483] HTTP endpoint opened                 url=http://127.0.0.1:8548  
INFO [06-20|09:30:20.002] Block synchronisation started  
INFO [06-20|09:30:20.081] Imported new block headers           count=164 elapsed=64.155ms number=164 hash=549faa...0c414a  
INFO [06-20|09:30:20.089] Imported new block receipts          count=100 elapsed=855.702µs number=100 hash=353b2e...a25650 age=5m30s size=400.00B  
INFO [06-20|09:30:20.089] Imported new block receipts          count=1 elapsed=53.677µs number=101 hash=a9bea8...b00c4a age=5m25s size=4.00B  
INFO [06-20|09:30:20.089] Committed new head block             number=101 hash=a9bea8...b00c4a  
INFO [06-20|09:30:20.101] Imported new chain segment            blocks=63 txs=0 mgas=0.000 elapsed=11.184ms mgasps=0.000 number=164 hash=549faa...0c414a cack  
INFO [06-20|09:30:23.019] Imported new block headers           count=2 elapsed=2.853ms number=166 hash=2c4235...aa27dd  
INFO [06-20|09:30:23.021] Imported new chain segment            blocks=2 txs=0 mgas=0.000 elapsed=902.892µs mgasps=0.000 number=166 hash=2c4235...aa27dd cack  
INFO [06-20|09:30:23.021] Fast sync complete, auto disabling  
INFO [06-20|09:30:25.005] Imported new chain segment            blocks=1 txs=0 mgas=0.000 elapsed=925.283µs mgasps=0.000 number=167 hash=c8a500...34cb4d cack
```

Thank you.