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How to install Ethereum on ubuntu 16.04

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Install Source on MacOS

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

```
cd go-ethereum/  
make all  
cd build/bin/  
vi ~/.bashrc  
export GOETHEREUM=/Users/tonycal/workspace/go-ethereum/build/bin  
export PATH=$PATH:$GOETHEREUM
```

Install Binary Package on Ubuntu

comandline

```
sudo apt-get update  
sudo apt-get upgrade  
sudo apt-get install software-properties-common  
sudo add-apt-repository -y ppa:ethereum/ethereum  
sudo apt-get update  
sudo apt-get upgrade  
sudo apt-get install ethereum  
geth --help
```

process

```
tonycal@bee:~$ sudo apt-get update  
Hit:1 https://download.docker.com/linux/ubuntu xenial InRelease  
Get:2 http://security.ubuntu.com/ubuntu xenial-security InRelease [102 kB]  
Get:3 http://security.ubuntu.com/ubuntu xenial-security/main amd64 DEP-11 Metadata  
Get:4 http://security.ubuntu.com/ubuntu xenial-security/main DEP-11 64x64 Icons [6  
Get:5 http://security.ubuntu.com/ubuntu xenial-security/universe amd64 DEP-11 Meta  
Get:6 http://security.ubuntu.com/ubuntu xenial-security/universe DEP-11 64x64 Icon  
Hit:7 http://cn.archive.ubuntu.com/ubuntu xenial InRelease  
Get:8 http://cn.archive.ubuntu.com/ubuntu xenial-updates InRelease [102 kB]  
Get:9 http://cn.archive.ubuntu.com/ubuntu xenial-backports InRelease [102 kB]  
Get:10 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 Packages [710  
Get:11 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main i386 Packages [660  
Get:12 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 DEP-11 Metada  
Get:13 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main DEP-11 64x64 Icons  
Get:14 http://cn.archive.ubuntu.com/ubuntu xenial-updates/universe amd64 Packages  
Get:15 http://cn.archive.ubuntu.com/ubuntu xenial-updates/universe i386 Packages [  
Get:16 http://cn.archive.ubuntu.com/ubuntu xenial-updates/universe amd64 DEP-11 Me  
Get:17 http://cn.archive.ubuntu.com/ubuntu xenial-updates/universe DEP-11 64x64 Ic  
Get:18 http://cn.archive.ubuntu.com/ubuntu xenial-updates/multiverse amd64 DEP-11  
Get:19 http://cn.archive.ubuntu.com/ubuntu xenial-backports/main amd64 DEP-11 Meta  
Get:20 http://cn.archive.ubuntu.com/ubuntu xenial-backports/universe amd64 DEP-11
```

```
Fetchd 4,054 kB in 15s (257 kB/s)
Reading package lists... Done
tonycal@bee:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  cpp-5 fwupdate fwupdate-signed g++-5 gcc-5 gcc-5-base gnome-software gnome-software
  libfwupd0 libgcc-5-dev libgfortran3 libgomp1 libitm1 liblsan0 libmpx0 libquadmath
  linux-firmware ubuntu-software
26 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 78.3 MB of archives.
After this operation, 10.4 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libquadmath0 a
Get:2 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libgomp1 amd64
Get:3 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libitm1 amd64
Get:4 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libatomic1 amd
Get:5 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libasan2 amd64
Get:6 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 liblsan0 amd64
Get:7 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libtsan0 amd64
Get:8 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libubsan0 amd6
Get:9 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libcilkrts5 am
Get:10 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libmpx0 amd64
Get:11 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 cpp-5 amd64 5
Get:12 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libcc1-0 amd6
Get:13 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 g++-5 amd64 5
Get:14 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 gcc-5 amd64 5
Get:15 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libgcc-5-dev
Get:16 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libstdc++-5-d
Get:17 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libgfortran3
Get:18 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 gcc-5-base am
Get:19 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libstdc++6 am
Get:20 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 fwupdate-sign
Get:21 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 fwupdate amd6
Get:22 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libfwupd0 amd6
Get:23 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 ubuntu-softwa
Get:24 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 gnome-softwar
Get:25 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 gnome-softwar
Get:26 http://cn.archive.ubuntu.com/ubuntu xenial-updates/main amd64 linux-firmwar
Fetchd 78.3 MB in 5min 48s (225 kB/s)
(Reading database ... 219011 files and directories currently installed.)
Preparing to unpack .../libquadmath0_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libquadmath0:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5)
Preparing to unpack .../libgomp1_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libgomp1:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ..
Preparing to unpack .../libitm1_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libitm1:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ...
Preparing to unpack .../libatomic1_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libatomic1:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5)
Preparing to unpack .../libasan2_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libasan2:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ..
Preparing to unpack .../liblsan0_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking liblsan0:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ..
```

```
Preparing to unpack .../libtsan0_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libtsan0:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ..
Preparing to unpack .../libubsan0_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libubsan0:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) .
Preparing to unpack .../libcilkrts5_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libcilkrts5:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5)
Preparing to unpack .../libmpx0_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libmpx0:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ...
Preparing to unpack .../cpp-5_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking cpp-5 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ...
Preparing to unpack .../libcc1-0_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libcc1-0:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ..
Preparing to unpack .../g++-5_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking g++-5 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ...
Preparing to unpack .../gcc-5_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking gcc-5 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5) ...
Preparing to unpack .../libgcc-5-dev_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libgcc-5-dev:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5
Preparing to unpack .../libstdc++-5-dev_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libstdc++-5-dev:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.0
Preparing to unpack .../libgfortran3_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libgfortran3:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5
Preparing to unpack .../gcc-5-base_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking gcc-5-base:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5)
Processing triggers for libc-bin (2.23-0ubuntu10) ...
Processing triggers for man-db (2.7.5-1) ...
Setting up gcc-5-base:amd64 (5.4.0-6ubuntu1~16.04.6) ...
(Reading database ... 219011 files and directories currently installed.)
Preparing to unpack .../libstdc++6_5.4.0-6ubuntu1~16.04.6_amd64.deb ...
Unpacking libstdc++6:amd64 (5.4.0-6ubuntu1~16.04.6) over (5.4.0-6ubuntu1~16.04.5)
Processing triggers for libc-bin (2.23-0ubuntu10) ...
Setting up libstdc++6:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Processing triggers for libc-bin (2.23-0ubuntu10) ...
(Reading database ... 219011 files and directories currently installed.)
Preparing to unpack .../fwupdate-signed_1.11.3+0.5-2ubuntu7_amd64.deb ...
Unpacking fwupdate-signed (1.11.3+0.5-2ubuntu7) over (1.11.1+0.5-2ubuntu5) ...
Preparing to unpack .../fwupdate_0.5-2ubuntu7_amd64.deb ...
Unpacking fwupdate (0.5-2ubuntu7) over (0.5-2ubuntu5) ...
Preparing to unpack .../libfwup0_0.5-2ubuntu7_amd64.deb ...
Unpacking libfwup0:amd64 (0.5-2ubuntu7) over (0.5-2ubuntu5) ...
Preparing to unpack .../ubuntu-software_3.20.5-0ubuntu0.16.04.8_amd64.deb ...
Unpacking ubuntu-software (3.20.5-0ubuntu0.16.04.8) over (3.20.5-0ubuntu0.16.04.7)
Preparing to unpack .../gnome-software_3.20.5-0ubuntu0.16.04.8_amd64.deb ...
Unpacking gnome-software (3.20.5-0ubuntu0.16.04.8) over (3.20.5-0ubuntu0.16.04.7)
Preparing to unpack .../gnome-software-common_3.20.5-0ubuntu0.16.04.8_all.deb ...
Unpacking gnome-software-common (3.20.5-0ubuntu0.16.04.8) over (3.20.5-0ubuntu0.16
Preparing to unpack .../linux-firmware_1.157.15_all.deb ...
Unpacking linux-firmware (1.157.15) over (1.157.14) ...
Processing triggers for man-db (2.7.5-1) ...
Processing triggers for libc-bin (2.23-0ubuntu10) ...
Processing triggers for hicolor-icon-theme (0.15-0ubuntu1) ...
Processing triggers for gnome-menus (3.13.3-6ubuntu3.1) ...
Processing triggers for desktop-file-utils (0.22-1ubuntu5.1) ...
Processing triggers for bamfdaemon (0.5.3~bzip0+16.04.20160824-0ubuntu1) ...
Rebuilding /usr/share/applications/bamf-2.index...
```

```
Processing triggers for mime-support (3.59ubuntu1) ...
Processing triggers for libglib2.0-0:amd64 (2.48.2-0ubuntu1) ...
Setting up libquadmath0:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libgomp1:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libitm1:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libatomic1:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libasan2:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up liblsan0:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libtsan0:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libubsan0:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libcilkrts5:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libmpx0:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up cpp-5 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libcc1-0:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libgcc-5-dev:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up gcc-5 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libstdc++-5-dev:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up g++-5 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libgfortran3:amd64 (5.4.0-6ubuntu1~16.04.6) ...
Setting up libfwup0:amd64 (0.5-2ubuntu7) ...
Setting up fwupdate (0.5-2ubuntu7) ...
System not running in EFI mode, not installing to EFI system partition.
efibootmgr: EFI variables are not supported on this system.
Setting up fwupdate-signed (1.11.3+0.5-2ubuntu7) ...
System not running in EFI mode, not installing to EFI system partition.
Setting up gnome-software-common (3.20.5-0ubuntu0.16.04.8) ...
Setting up gnome-software (3.20.5-0ubuntu0.16.04.8) ...
Setting up ubuntu-software (3.20.5-0ubuntu0.16.04.8) ...
Setting up linux-firmware (1.157.15) ...
update-initramfs: Generating /boot/initrd.img-4.13.0-32-generic
W: Possible missing firmware /lib/firmware/amdgpu/raven_gpu_info.bin for module amdgpu
W: Possible missing firmware /lib/firmware/amdgpu/raven_rlc.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_mec2.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_mec.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_me.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_pfp.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_ce.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_sdma.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_vcn.bin for module amdgp
update-initramfs: Generating /boot/initrd.img-4.13.0-31-generic
W: Possible missing firmware /lib/firmware/amdgpu/raven_gpu_info.bin for module am
W: Possible missing firmware /lib/firmware/amdgpu/raven_rlc.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_mec2.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_mec.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_me.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_pfp.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_ce.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_sdma.bin for module amdgp
W: Possible missing firmware /lib/firmware/amdgpu/raven_vcn.bin for module amdgp
Processing triggers for libc-bin (2.23-0ubuntu10) ...
tonycal@bee:~$ sudo apt-get install software-properties-common
Reading package lists... Done
Building dependency tree
Reading state information... Done
software-properties-common is already the newest version (0.96.20.7).
```



```
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
tonycal@bee:~$ sudo add-apt-repository -y ppa:ethereum/ethereum
gpg: keyring `/tmp/tmp6e6ei13t/secring.gpg' created
gpg: keyring `/tmp/tmp6e6ei13t/pubring.gpg' created
gpg: requesting key 923F6CA9 from hkp server keyserver.ubuntu.com
gpg: /tmp/tmp6e6ei13t/trustdb.gpg: trustdb created
gpg: key 923F6CA9: public key "Launchpad PPA for Ethereum" imported
gpg: Total number processed: 1
gpg:             imported: 1 (RSA: 1)
OK
tonycal@bee:~$ sudo apt-get update
Hit:1 https://download.docker.com/linux/ubuntu xenial InRelease
Hit:2 http://cn.archive.ubuntu.com/ubuntu xenial InRelease
Hit:3 http://cn.archive.ubuntu.com/ubuntu xenial-updates InRelease
Hit:4 http://cn.archive.ubuntu.com/ubuntu xenial-backports InRelease
Hit:5 http://security.ubuntu.com/ubuntu xenial-security InRelease
Get:6 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial InRelease [17.5 kB]
Get:7 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 Packages
Get:8 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main i386 Packages
Get:9 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main Translation-en
Fetched 34.0 kB in 24s (1,375 B/s)
Reading package lists... Done
tonycal@bee:~$ sudo apt-get install ethereum
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  abigen bootnode evm geth puppeth rlpdump swarm wnode
The following NEW packages will be installed:
  abigen bootnode ethereum evm geth puppeth rlpdump swarm wnode
0 upgraded, 9 newly installed, 0 to remove and 0 not upgraded.
Need to get 23.1 MB of archives.
After this operation, 79.8 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 abigen a
Get:2 http://cn.archive.ubuntu.com/ubuntu xenial/universe amd64 swarm amd64 2.1.6-
Get:3 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 bootnode
Get:4 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 evm amd6
Get:5 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 geth amd
Get:6 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 puppeth
Get:7 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 rlpdump
Get:8 http://ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main amd64 wnode am
Get:9 http://101.96.10.27/ppa.launchpad.net/ethereum/ethereum/ubuntu xenial/main a
Fetched 23.1 MB in 17min 0s (22.6 kB/s)
Selecting previously unselected package swarm.
(Reading database ... 219029 files and directories currently installed.)
Preparing to unpack .../swarm_2.1.6-1_amd64.deb ...
Unpacking swarm (2.1.6-1) ...
Selecting previously unselected package abigen.
Preparing to unpack .../abigen_1.7.3+build11486+xenial_amd64.deb ...
Unpacking abigen (1.7.3+build11486+xenial) ...
Selecting previously unselected package bootnode.
Preparing to unpack .../bootnode_1.7.3+build11486+xenial_amd64.deb ...
Unpacking bootnode (1.7.3+build11486+xenial) ...
Selecting previously unselected package evm.
```

```
Preparing to unpack .../evm_1.7.3+build11486+xenial_amd64.deb ...
Unpacking evm (1.7.3+build11486+xenial) ...
Selecting previously unselected package geth.
Preparing to unpack .../geth_1.7.3+build11486+xenial_amd64.deb ...
Unpacking geth (1.7.3+build11486+xenial) ...
Selecting previously unselected package puppeth.
Preparing to unpack .../puppeth_1.7.3+build11486+xenial_amd64.deb ...
Unpacking puppeth (1.7.3+build11486+xenial) ...
Selecting previously unselected package rlpdump.
Preparing to unpack .../rlpdump_1.7.3+build11486+xenial_amd64.deb ...
Unpacking rlpdump (1.7.3+build11486+xenial) ...
Selecting previously unselected package wnode.
Preparing to unpack .../wnode_1.7.3+build11486+xenial_amd64.deb ...
Unpacking wnode (1.7.3+build11486+xenial) ...
Selecting previously unselected package ethereum.
Preparing to unpack .../ethereum_1.7.3+build11486+xenial_amd64.deb ...
Unpacking ethereum (1.7.3+build11486+xenial) ...
Processing triggers for man-db (2.7.5-1) ...
Setting up swarm (2.1.6-1) ...
Setting up abigen (1.7.3+build11486+xenial) ...
Setting up bootnode (1.7.3+build11486+xenial) ...
Setting up evm (1.7.3+build11486+xenial) ...
Setting up geth (1.7.3+build11486+xenial) ...
Setting up puppeth (1.7.3+build11486+xenial) ...
Setting up rlpdump (1.7.3+build11486+xenial) ...
Setting up wnode (1.7.3+build11486+xenial) ...
Setting up ethereum (1.7.3+build11486+xenial) ...
```

geth command manual

```
tonycal@bee:~$ geth --help
```

NAME:

geth - the go-ethereum command line interface

Copyright 2013-2017 The go-ethereum Authors

USAGE:

geth [options] command [command options] [arguments...]

VERSION:

1.7.3-stable-4bb3c89d

COMMANDS:

account	Manage accounts
attach	Start an interactive JavaScript environment (connect to node)
bug	opens a window to report a bug on the geth repo
console	Start an interactive JavaScript environment
copydb	Create a local chain from a target chaindata folder
dump	Dump a specific block from storage
dumpconfig	Show configuration values
export	Export blockchain into file

import	Import a blockchain file
init	Bootstrap and initialize a new genesis block
js	Execute the specified JavaScript files
license	Display license information
makecache	Generate ethash verification cache (for testing)
makedag	Generate ethash mining DAG (for testing)
monitor	Monitor and visualize node metrics
removedb	Remove blockchain and state databases
version	Print version numbers
wallet	Manage Ethereum presale wallets
help, h	Shows a list of commands or help for one command

ETHEREUM OPTIONS:

--config value	TOML configuration file
--datadir "/home/tonycal/.ethereum"	Data directory for the databases and keysto
--keystore	Directory for the keystore (default = insid
--noub	Disables monitoring for and managing USB ha
--networkid value	Network identifier (integer, 1=Frontier, 2=
--testnet	Ropsten network: pre-configured proof-of-wo
--rinkeby	Rinkeby network: pre-configured proof-of-au
--syncmode "fast"	Blockchain sync mode ("fast", "full", or "1
--ethstats value	Reporting URL of a ethstats service (nodena
--identity value	Custom node name
--lightserv value	Maximum percentage of time allowed for serv
--lightpeers value	Maximum number of LES client peers (default
--lightkdf	Reduce key-derivation RAM & CPU usage at so

DEVELOPER CHAIN OPTIONS:

--dev	Ephemeral proof-of-authority network with a pre-funded devel
--dev.period value	Block period to use in developer mode (0 = mine only if tran

ETHASH OPTIONS:

--ethash.cachedir	Directory to store the ethash verificat
--ethash.cachesinmem value	Number of recent ethash caches to keep
--ethash.cachesondisk value	Number of recent ethash caches to keep
--ethash.dagdir "/home/tonycal/.ethash"	Directory to store the ethash mining DA
--ethash.dagsinmem value	Number of recent ethash mining DAGs to
--ethash.dagsondisk value	Number of recent ethash mining DAGs to

TRANSACTION POOL OPTIONS:

--txpool.nolocals	Disables price exemptions for locally submitted tra
--txpool.journal value	Disk journal for local transaction to survive node
--txpool.rejournal value	Time interval to regenerate the local transaction j
--txpool.pricelimit value	Minimum gas price limit to enforce for acceptance i
--txpool.pricebump value	Price bump percentage to replace an already existin
--txpool.accounts slots value	Minimum number of executable transaction slots guar
--txpool.global slots value	Maximum number of executable transaction slots for
--txpool.account queue value	Maximum number of non-executable transaction slots
--txpool.global queue value	Maximum number of non-executable transaction slots
--txpool.lifetime value	Maximum amount of time non-executable transaction a

PERFORMANCE TUNING OPTIONS:

--cache value	Megabytes of memory allocated to internal caching (min
--trie-cache-gens value	Number of trie node generations to keep in memory (defa

ACCOUNT OPTIONS:

- unlock value Comma separated list of accounts to unlock
- password value Password file to use for non-interactive password input

API AND CONSOLE OPTIONS:

- rpc Enable the HTTP-RPC server
- rpcaddr value HTTP-RPC server listening interface (default: "localhost")
- rpcport value HTTP-RPC server listening port (default: 8545)
- rpcapi value API's offered over the HTTP-RPC interface
- ws Enable the WS-RPC server
- wsaddr value WS-RPC server listening interface (default: "localhost")
- wsport value WS-RPC server listening port (default: 8546)
- wsapi value API's offered over the WS-RPC interface
- wsorigins value Origins from which to accept websockets requests
- ipcdisable Disable the IPC-RPC server
- ipcpath Filename for IPC socket/pipe within the datadir (explicit
- rpccorsdomain value Comma separated list of domains from which to accept cros
- jspath loadScript JavaScript root path for loadScript (default: ".")
- exec value Execute JavaScript statement
- preload value Comma separated list of JavaScript files to preload into

NETWORKING OPTIONS:

- bootnodes value Comma separated enode URLs for P2P discovery bootstrap (se
- bootnodesv4 value Comma separated enode URLs for P2P v4 discovery bootstrap
- bootnodesv5 value Comma separated enode URLs for P2P v5 discovery bootstrap
- port value Network listening port (default: 30303)
- maxpeers value Maximum number of network peers (network disabled if set t
- maxpendpeers value Maximum number of pending connection attempts (defaults us
- nat value NAT port mapping mechanism (any|none|upnp|pmp|extip:<IP>)
- nodiscover Disables the peer discovery mechanism (manual peer additio
- v5disc Enables the experimental RLPx V5 (Topic Discovery) mechani
- netrestrict value Restricts network communication to the given IP networks (
- nodekey value P2P node key file
- nodekeyhex value P2P node key as hex (for testing)

MINER OPTIONS:

- mine Enable mining
- minerthreads value Number of CPU threads to use for mining (default: 4)
- etherbase value Public address for block mining rewards (default = fir
- targetgaslimit value Target gas limit sets the artificial target gas floor
- gasprice "180000000000" Minimal gas price to accept for mining a transactions
- extradata value Block extra data set by the miner (default = client ve

GAS PRICE ORACLE OPTIONS:

- gpoblocks value Number of recent blocks to check for gas prices (default:
- gpopercentile value Suggested gas price is the given percentile of a set of r

VIRTUAL MACHINE OPTIONS:

- vmdebug Record information useful for VM and contract debugging

LOGGING AND DEBUGGING OPTIONS:

- metrics Enable metrics collection and reporting
- fakepow Disables proof-of-work verification
- nocompaction Disables db compaction after import
- verbosity value Logging verbosity: 0=silent, 1=error, 2=warn, 3=info,

```
--vmodule value      Per-module verbosity: comma-separated list of <pattern>
--backtrace value    Request a stack trace at a specific logging statement
--debug              Prepends log messages with call-site location (file an
--pprof              Enable the pprof HTTP server
--pprofaddr value     pprof HTTP server listening interface (default: "127.0
--pprofport value     pprof HTTP server listening port (default: 6060)
--memprofile rate value Turn on memory profiling with the given rate (default:
--blockprofile rate value Turn on block profiling with the given rate (default:
--cpuprofile value    Write CPU profile to the given file
--trace value         Write execution trace to the given file
```

WHISPER (EXPERIMENTAL) OPTIONS:

```
--shh                Enable whisper
--shh.maxmessagesize value Max message size accepted (default: 1048576)
--shh.pow value       Minimum POW accepted (default: 0.2)
```

DEPRECATED OPTIONS:

```
--fast  Enable fast syncing through state downloads
--light  Enable light client mode
```

MISC OPTIONS:

```
--help, -h  show help
```

COPYRIGHT:

```
Copyright 2013-2017 The go-ethereum Authors
```

Init private ethereum

```
tonycal@bee:~/workspace/private-geth$ geth --datadir data0 init genesis.json
WARN [02-03|14:57:08] No etherbase set and no accounts found as default
INFO [02-03|14:57:08] Allocated cache and file handles      database=/home/tony
INFO [02-03|14:57:09] Writing custom genesis block
INFO [02-03|14:57:09] Successfully wrote genesis state      database=chaindata
INFO [02-03|14:57:09] Allocated cache and file handles      database=/home/tony
INFO [02-03|14:57:09] Writing custom genesis block
INFO [02-03|14:57:09] Successfully wrote genesis state      database=lightchain
```

Geth New Account

```
tonycal@bee:~/workspace/private-geth/data0$ geth --datadir ./data0 --networkid 11
WARN [02-03|15:00:07] No etherbase set and no accounts found as default
INFO [02-03|15:00:07] Starting peer-to-peer node            instance=Geth/v1.7.
INFO [02-03|15:00:07] Allocated cache and file handles      database=/home/tony
INFO [02-03|15:00:07] Writing default main-net genesis block
INFO [02-03|15:00:08] Initialised chain configuration      config="{ChainID: 1
INFO [02-03|15:00:08] Disk storage enabled for ethash caches dir=/home/tonycal/w
```

```

INFO [02-03|15:00:08] Disk storage enabled for ethash DAGs      dir=/home/tonycail/.
INFO [02-03|15:00:08] Initialising Ethereum protocol              versions="[63 62]"
INFO [02-03|15:00:08] Loaded most recent local header              number=0 hash=d4e56
INFO [02-03|15:00:08] Loaded most recent local full block          number=0 hash=d4e56
INFO [02-03|15:00:08] Loaded most recent local fast block          number=0 hash=d4e56
INFO [02-03|15:00:08] Regenerated local transaction journal        transactions=0 acco
INFO [02-03|15:00:08] Starting P2P networking
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
2018/02/03 15:00:10 ssdp: got unexpected search target result "urn:schemas-upnp-or
INFO [02-03|15:00:10] UDP listener up                             self=enode://a61c77
INFO [02-03|15:00:10] RLPx listener up                           self=enode://a61c77
INFO [02-03|15:00:10] IPC endpoint opened: /home/tonycail/workspace/private-geth/da
Welcome to the Geth JavaScript console!

```

```

instance: Geth/v1.7.3-stable-4bb3c89d/linux-amd64/go1.9
modules: admin:1.0 debug:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 txpool

```

```

> eth.accounts
[]
> personal.newAccount("123")
"0xcbbd289cf17590b5e224efd2129fb203bd94331b8"

```

web3 Command

```

tonycail@bee:~/workspace/privateChain$ geth attach ./data1/geth.ipc
Welcome to the Geth JavaScript console!

```

```

instance: Geth/v1.7.3-stable-4bb3c89d/linux-amd64/go1.9
coinbase: 0xa1e986f88132edc7e952c293466fb6495e96d4ff
at block: 0 (Thu, 01 Jan 1970 08:00:00 CST)
datadir: /home/tonycail/workspace/privateChain/data1
modules: admin:1.0 clique:1.0 debug:1.0 eth:1.0 miner:1.0 net:1.0 personal:1.0 rp

```

```

> web3
{
  admin: {
    datadir: "/home/tonycail/workspace/privateChain/data1",
    nodeInfo: {

```

```

enode: "enode://b6df662a6e5ab31adaf1fb1b29026a565aaeab7b412c91aa35341838e6ec
id: "b6df662a6e5ab31adaf1fb1b29026a565aaeab7b412c91aa35341838e6ec020b527da18
ip: "::",
listenAddr: "[::]:34031",
name: "Geth/v1.7.3-stable-4bb3c89d/linux-amd64/go1.9",
ports: {
  discovery: 0,
  listener: 34031
},
protocols: {
  eth: {...},
  shh: {...}
}
},
peers: [],
addPeer: function(),
exportChain: function(),
getDatadir: function(callback),
getNodeInfo: function(callback),
getPeers: function(callback),
importChain: function(),
removePeer: function(),
sleep: function github.com/ethereum/go-ethereum/console.(*bridge).Sleep-fm(),
sleepBlocks: function github.com/ethereum/go-ethereum/console.(*bridge).SleepB
startRPC: function(),
startWS: function(),
stopRPC: function(),
stopWS: function()
},
bzz: {
  hive: undefined,
  info: undefined,
  blockNetworkRead: function(),
  download: function(),
  get: function(),
  getHive: function(callback),
  getInfo: function(callback),
  modify: function(),
  put: function(),
  retrieve: function(),
  store: function(),
  swapEnabled: function(),
  syncEnabled: function(),
  upload: function()
},
clique: {
  proposals: {},
  discard: function(),
  getProposals: function(callback),
  getSigners: function(),
  getSignersAtHash: function(),
  getSnapshot: function(),
  getSnapshotAtHash: function(),
  propose: function()
},

```

```
currentProvider: {
  newAccount: function(),
  openWallet: function(),
  send: function github.com/ethereum/go-ethereum/console.(*bridge).Send-fm(),
  sendAsync: function github.com/ethereum/go-ethereum/console.(*bridge).Send-fm(),
  sign: function(),
  unlockAccount: function()
},
db: {
  getHex: function(),
  getString: function(),
  putHex: function(),
  putString: function()
},
debug: {
  backtraceAt: function(),
  blockProfile: function(),
  chaindbCompact: function(),
  chaindbProperty: function(),
  cpuProfile: function(),
  dumpBlock: function(),
  freeOSMemory: function(),
  gcStats: function(),
  getBadBlocks: function(),
  getBlockRlp: function(),
  getModifiedAccountsByHash: function(),
  getModifiedAccountsByNumber: function(),
  goTrace: function(),
  memStats: function(),
  metrics: function(),
  preimage: function(),
  printBlock: function(),
  seedHash: function(),
  setBlockProfileRate: function(),
  setGCPercent: function(),
  setHead: function(),
  stacks: function(),
  startCPUProfile: function(),
  startGoTrace: function(),
  stopCPUProfile: function(),
  stopGoTrace: function(),
  storageRangeAt: function(),
  traceBlock: function(),
  traceBlockByHash: function(),
  traceBlockByNumber: function(),
  traceBlockFromFile: function(),
  traceTransaction: function(),
  verbosity: function(),
  vmodule: function(),
  writeBlockProfile: function(),
  writeMemProfile: function()
},
eth: {
  accounts: ["0xa1e986f88132edc7e952c293466fb6495e96d4fff"],
  blockNumber: 0,
```



```
coinbase: "0xa1e986f88132edc7e952c293466fb6495e96d4ff",
compile: {
  lll: function(),
  serpent: function(),
  solidity: function()
},
defaultAccount: undefined,
defaultBlock: "latest",
gasPrice: 1,
hashrate: 0,
mining: true,
pendingTransactions: [],
protocolVersion: "0x3f",
syncing: false,
call: function(),
contract: function(abi),
estimateGas: function(),
filter: function(options, callback, filterCreationErrorCallback),
getAccounts: function(callback),
getBalance: function(),
getBlock: function(),
getBlockNumber: function(callback),
getBlockTransactionCount: function(),
getBlockUncleCount: function(),
getCode: function(),
getCoinbase: function(callback),
getCompilers: function(),
getGasPrice: function(callback),
getHashrate: function(callback),
getMining: function(callback),
getPendingTransactions: function(callback),
getProtocolVersion: function(callback),
getRawTransaction: function(),
getRawTransactionFromBlock: function(),
getStorageAt: function(),
getSyncing: function(callback),
getTransaction: function(),
getTransactionCount: function(),
getTransactionFromBlock: function(),
getTransactionReceipt: function(),
getUncle: function(),
getWork: function(),
iban: function(iban),
icapNamereg: function(),
isSyncing: function(callback),
namereg: function(),
resend: function(),
sendIBANTransaction: function(),
sendRawTransaction: function(),
sendTransaction: function(),
sign: function(),
signTransaction: function(),
submitTransaction: function(),
submitWork: function()
},
```

```

isIBAN: undefined,
miner: {
  getHashrate: function(),
  setEtherbase: function(),
  setExtra: function(),
  setGasPrice: function(),
  start: function(),
  stop: function()
},
net: {
  listening: true,
  peerCount: 0,
  version: "123",
  getListening: function(callback),
  getPeerCount: function(callback),
  getVersion: function(callback)
},
personal: {
  listAccounts: ["0xa1e986f88132edc7e952c293466fb6495e96d4ff"],
  listWallets: [{
    accounts: [...],
    status: "Unlocked",
    url: "keystore:///home/tonycal/workspace/privateChain/data1/keystore/UTC- -
  }],
  deriveAccount: function(),
  ecRecover: function(),
  getListAccounts: function(callback),
  getListWallets: function(callback),
  importRawKey: function(),
  lockAccount: function(),
  newAccount: function github.com/ethereum/go-ethereum/console.(*bridge).NewAcco
  openWallet: function github.com/ethereum/go-ethereum/console.(*bridge).OpenWal
  sendTransaction: function(),
  sign: function github.com/ethereum/go-ethereum/console.(*bridge).Sign-fm(),
  unlockAccount: function github.com/ethereum/go-ethereum/console.(*bridge).Unlo
},
providers: {
  HttpProvider: function(host, timeout, user, password),
  IpcProvider: function(path, net)
},
rpc: {
  modules: {
    admin: "1.0",
    clique: "1.0",
    debug: "1.0",
    eth: "1.0",
    miner: "1.0",
    net: "1.0",
    personal: "1.0",
    rpc: "1.0",
    shh: "1.0",
    txpool: "1.0",
    web3: "1.0"
  },
  getModules: function(callback)

```

```
  },
  settings: {
    defaultAccount: undefined,
    defaultBlock: "latest"
  },
  shh: {
    info: {
      maxMessageSize: 1048576,
      memory: 0,
      messages: 0,
      minPow: 0.2
    },
    version: 5,
    addPrivateKey: function(),
    addSymKey: function(),
    deleteKeyPair: function(),
    deleteSymKey: function(),
    generateSymKeyFromPassword: function(),
    getInfo: function(callback),
    getPrivateKey: function(),
    getPublicKey: function(),
    getSymKey: function(),
    getVersion: function(callback),
    hasKeyPair: function(),
    hasSymKey: function(),
    markTrustedPeer: function(),
    newKeyPair: function(),
    newMessageFilter: function(options, callback, filterCreationErrorCallback),
    newSymKey: function(),
    post: function(),
    setMaxMessageSize: function(),
    setMinPow: function()
  },
  txpool: {
    content: {
      pending: {},
      queued: {}
    },
    inspect: {
      pending: {},
      queued: {}
    },
    status: {
      pending: 0,
      queued: 0
    },
    getContent: function(callback),
    getInspect: function(callback),
    getStatus: function(callback)
  },
  version: {
    api: "0.20.1",
    ethereum: "0x3f",
    network: "123",
    node: "Geth/v1.7.3-stable-4bb3c89d/linux-amd64/go1.9",
```

```
    whisper: "5.0",
    getEthereum: function(callback),
    getNetwork: function(callback),
    getNode: function(callback),
    getWhisper: function(callback)
  },
  BigNumber: function a(e,n),
  createBatch: function(),
  fromAscii: function(str),
  fromDecimal: function(value),
  fromICAP: function(icap),
  fromUtf8: function(str),
  fromWei: function(number, unit),
  isAddress: function(address),
  isChecksumAddress: function(address),
  isConnected: function(),
  padLeft: function(string, chars, sign),
  padRight: function(string, chars, sign),
  reset: function(keepIsSyncing),
  setProvider: function(provider),
  sha3: function(string, options),
  toAscii: function(hex),
  toBigNumber: function(number),
  toChecksumAddress: function(address),
  toDecimal: function(value),
  toHex: function(val),
  toUtf8: function(hex),
  toWei: function(number, unit)
}
>
```

geth command

```
#!/bin/bash
```

```
geth --networkid 123 --dev --datadir data1 --rpc --rpcaddr 192.168.1.15 --rpcport
```

```
# console
# $ geth attach ./data1/geth.ipc
# eth
# net
# admin
# miner
# personal
# txpool
# web3
```

View MyBalance

```
> web3.fromWei(eth.getBalance(eth.coinbase))
7790
> web3.fromWei(web3.eth.getBalance(web3.eth.coinbase));
8320
>
```

Join Ethereum Network

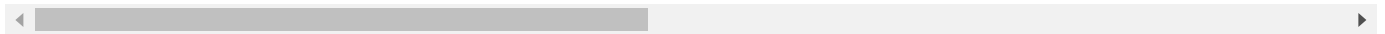
- 链接该节点的第二个方法：

首先，用geth命令打开命令行钱包，然后新建一个终端窗口，输入命令 `geth attach`。

然后，在新窗口中输入命令行

```
$ geth attach ./data1/geth.ipc
```

```
> admin.addPeer("enode://91922b12115c067005c574844c6bbdb114eb262f90b6355cec89e13b
```



- reference <https://github.com/ethereum/go-ethereum/wiki/Connecting-to-the-network>
- `removePeer`

```
admin.removePeer('4ffbd0b6c6beb654e35992d4f9115091b6bd5eddc251acde9f477a78e3b766d
```



Mist - Eth Wallet

- `cd /Users/tonycal/Library/Ethereum`

```
geth attach ipc:geth.ipc
```

Parity

- New Ethereum Parity client
- Ethereum Wallet

CoinMarketCap

- <https://coinmarketcap.com>

代币市场排行榜

- <https://www.coindesk.com/>

CoinDesk - Leader in blockchain news.

- <https://etherscan.io/tokens>

Ethereum token scan

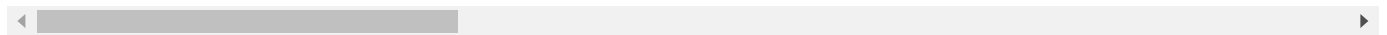
- <https://etherscan.io/>

mkr币交易平台：

<https://gate.io/>（注册以后，进入USDT交易区查看）

makerdao项目介绍

mkr币是Maker系统的管理型代币和效用代币，用来支付借Dai的稳定费用以及参与管理系统。与Dai稳定货币不



install solidity

- brew install solidity
- open link : <https://brew.sh>

```
/usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install
```



- <https://github.com/ethereum/browser-solidity>

Remix is a browser-based compiler and IDE that enables users to build Ethereum co
To try it out, visit <https://remix.ethereum.org>.



- references <http://solidity.readthedocs.io/en/latest/installing-solidity.html>

```
brew update  
brew upgrade  
brew tap ethereum/ethereum  
brew install solidity  
brew linkapps solidity
```

- uninstall

```
brew unlink solidity  
# Install 0.4.8
```

```
brew install https://raw.githubusercontent.com/ethereum/homebrew-ethereum/77cce03
```

- which solc

```
/usr/local/bin/solc
```

```
$ /usr/local/bin/solc --version  
solc, the solidity compiler commandline interface  
Version: 0.4.19+commit.c4cbbb05.Darwin.appleclang
```

Remix

- 是Remix，这是一个在线的Solidity编译器。

```
http://remix.ethereum.org
```

References

- <http://blog.csdn.net/ddffr/article/details/73733850>
- 以太坊客户端Geth命令用法-参数详解

Geth在以太坊智能合约开发中最常用的工具（必备开发工具），一个多用途的命令行工具。
熟悉Geth可以让我们的效率，大家可收藏起来作为Geth命令用法手册。 本文主要是对geth help的翻

- <https://www.cnblogs.com/tinyxiong/p/7918706.html>

区块链学堂（8）：Geth 基本命令

- <http://blog.csdn.net/ethchinese/article/details/62220915>

Ubuntu下geth搭建私有链+部署智能合约+与合约交互笔记

- <http://blog.csdn.net/yooliee/article/details/72818932>

ubuntu系统搭建以太坊私有链

- <https://www.cnblogs.com/liangyue/p/6824858.html>

JavaScript Console

- <https://github.com/ethereum/go-ethereum/wiki/JavaScript-Console>
- 快速同步以太坊区块链：Geth长期节点连接方法

<http://8btc.com/thread-29538-1-1.html>

- [搭建Geth本地私有链网络](#)
- [以太坊客户端Geth命令用法-参数详解](#)
- [以太坊客户端Geth命令用法-参数详解](#)
- [Geth 控制台使用及 Web3.js 使用实战](#)
- [【区块链基础02】-以太坊基本概念-Geth-安装](#)
- [1.2区块链基础架构](#)
- [Go-Ethereum](#)
- [以太坊挖矿最新图文教程-windows版](#)

See Also

- [hdgenesis.json](#)
- [Ethereum Json RPC Devlepmnt](#)
- [Create a Hello World Contract in Ethereum](#)
- <https://github.com/howardwu/IPFS-Ethereum-Storage>
- 挖矿 <https://blog.csdn.net/rth362147773/article/details/79052993>
- [手把手教你发行自己的以太坊ERC20 Token](#)

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