Step 1: Installing Geth on Ubuntu

sudo apt update

```
ubuntu@ubuntu:~/Desktop$ sudo apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:4 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy InRelease [17.5 kB]
Hit:5 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease
Get:6 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1,519 kB]
Get:7 http://security.ubuntu.com/ubuntu jammy-security/main i386 Packages [436 kB]
Get:8 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [1,303 kB]
Get:9 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [233 kB]
Get:10 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [1,616 kB
]
Get:11 http://security.ubuntu.com/ubuntu jammy-security/restricted Translation-en [271 kB]
Get:12 http://security.ubuntu.com/ubuntu jammy-security/universe i386 Packages [599 kB]
Get:13 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [852 kB]
Get:14 http://security.ubuntu.com/ubuntu jammy-security/universe Translation-en [163 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu jammy-updates/main i386 Packages [602 kB]
Get:16 http://in.archive.ubuntu.com/ubuntu jammy-updates/main Translation-en [293 kB]
Get:17 http://in.archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [1,644 k
B]
Get:18 http://in.archive.ubuntu.com/ubuntu jammy-updates/restricted Translation-en [274 kB]
Get:19 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1,060 kB]
Get:20 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe i386 Packages [698 kB]
Get:21 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe Translation-en [241 kB]
```

Sudo dpkg –configure -a

```
ubuntu@ubuntu:~/Desktop$ sudo dpkg --configure -a
```

sudo apt install software-properties-common

```
ubuntu@ubuntu:~/Desktop$ sudo apt install software-properties-common
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  python3-software-properties software-properties-gtk ubuntu-advantage-tools
  ubuntu-pro-client
Recommended packages:
  ubuntu-pro-client-l10n
The following NEW packages will be installed:
  ubuntu-pro-client
The following packages will be upgraded:
  python3-software-properties software-properties-common software-properties-gtk
  ubuntu-advantage-tools
4 upgraded, 1 newly installed, 0 to remove and 231 not upgraded.
Need to get 322 kB of archives.
After this operation, 1,339 kB disk space will be freed.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ubuntu-advantage-tools a
ll 31.2~22.04 [10.8 kB]
```

sudo add-apt-repository -y ppa:ethereum/ethereum

```
ubuntu@ubuntu:~/Desktop$ sudo add-apt-repository -y ppa:ethereum/ethereum
Repository: 'deb https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu/ jammy main'
More info: https://launchpad.net/~ethereum/+archive/ubuntu/ethereum
Adding repository.
Found existing deb entry in /etc/apt/sources.list.d/ethereum-ubuntu-ethereum-jammy.list
Adding deb entry to /etc/apt/sources.list.d/ethereum-ubuntu-ethereum-jammy.list
Found existing deb-src entry in /etc/apt/sources.list.d/ethereum-ubuntu-ethereum-jammy.list
Adding disabled deb-src entry to /etc/apt/sources.list.d/ethereum-ubuntu-ethereum-jammy.lis
t
Adding key to /etc/apt/trusted.gpg.d/ethereum-ubuntu-ethereum.gpg with fingerprint 2A518C81
9BE37D2C2031944D1C52189C923F6CA9
Hit:1 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:5 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy InRelease
Reading package lists... Done
```

sudo apt update

```
ubuntu@ubuntu:~/Desktop$ sudo apt update
Hit:1 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:4 https://ppa.launchpadcontent.net/ethereum/ethereum/ubuntu jammy InRelease
Hit:5 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
231 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@ubuntu:~/Desktop$
```

sudo apt install geth

```
ubuntu@ubuntu:~/Desktop$ sudo apt install geth
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
geth is already the newest version (1.13.14+build29502+jammy).
geth set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 231 not upgraded.
```

Step 2: Check the version of Geth on the Terminal

geth version

```
ubuntu@ubuntu:~/Desktop$ geth version
Geth
Version: 1.13.14-stable
Git Commit: 2bd6bd01d2e8561dd7fc21b631f4a34ac16627a1
Architecture: amd64
Go Version: go1.21.6
Operating System: linux
GOPATH=
GOROOT=
ubuntu@ubuntu:~/Desktop$
```

3. Step - 3: Create a Private Ethereum Network

1. Create a folder named, private_ethereum_setup

```
ubuntu@ubuntu:~/Desktop$ mkdir private_ethereum_setup
```

2. Create 2 subfolders named node1 and node2 in the folder private_ethereum_setup

```
ubuntu@ubuntu:~/Desktop$ cd private_ethereum_setup/
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ mkdir node1 node2
```

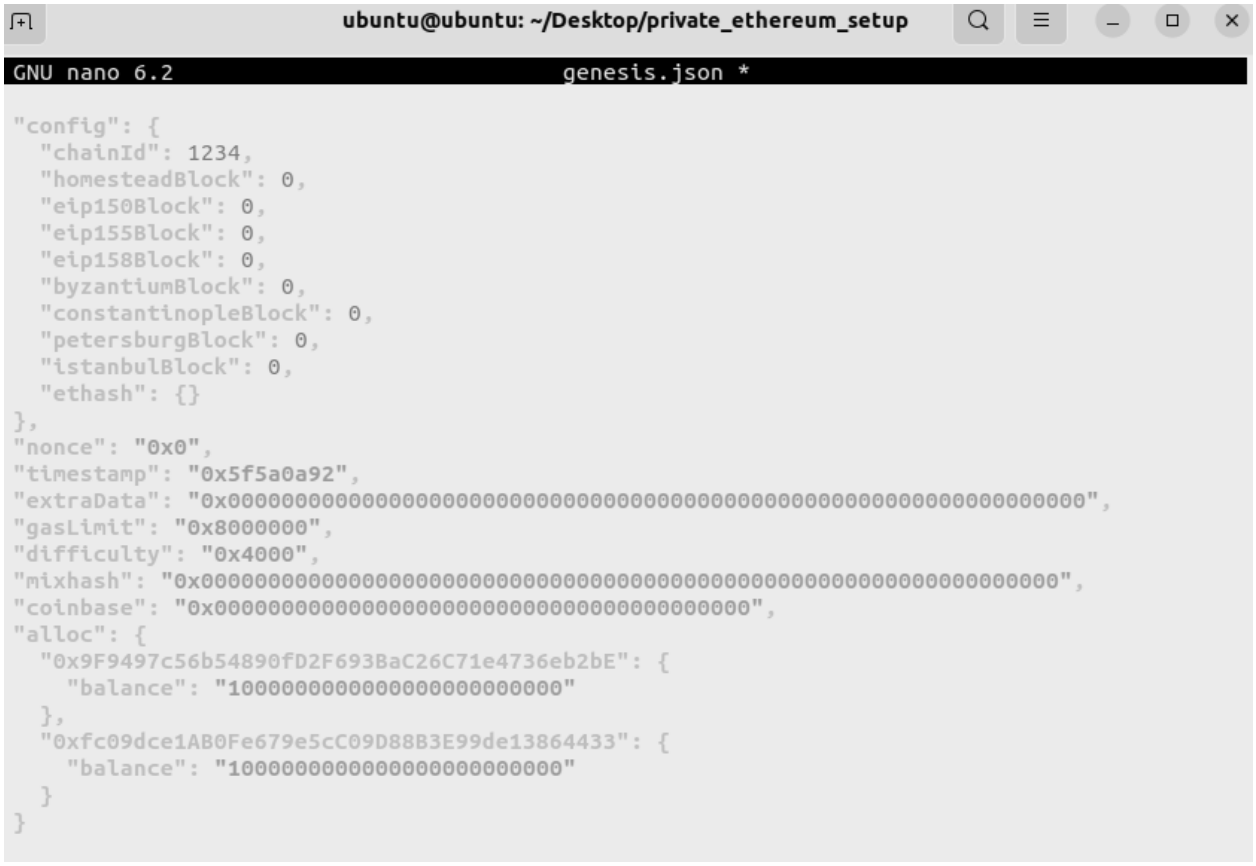
3. Create 2 accounts in the folder corresponding to node1 and node2

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ geth --datadir node1 account new
INFO [03-31|10:20:39.436] Maximum peer count                       ETH=50 total=50
INFO [03-31|10:20:39.438] 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 passwor
d.
Password:
Repeat password:

Your new key was generated

Public address of the key:   0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE
Path of the secret key file: node1/keystore/UTC--2024-03-31T04-50-51.743374765Z--9f9497c56b548
90fd2f693bac26c71e4736eb2be

- 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!

ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ S
```

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ geth --datadir node2 account new
INFO [03-31|10:21:31.739] Maximum peer count                       ETH=50 total=50
INFO [03-31|10:21:31.741] 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 passwor
d.
Password:
Repeat password:

Your new key was generated

Public address of the key:   0xfc09dce1AB0Fe679e5cC09D88B3E99de13864433
Path of the secret key file: node2/keystore/UTC--2024-03-31T04-51-35.934981574Z--fc09dce1ab0fe
679e5cc09d88b3e99de13864433

- 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!

ubuntu@ubuntu:~/Desktop/private_ethereum_setup$
```

4. Create a genesis.json file in the folder, private_ethereum_setup

nano genesis.json



5. Initialize the nodes with the genesis file

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ geth --datadir node1 init genesis.json
INFO [03-31|10:33:21.842] Maximum peer count                       ETH=50 total=50
INFO [03-31|10:33:21.843] Smartcard socket not found, disabling    err="stat /run/pcscd/pcscd.
comm: no such file or directory"
INFO [03-31|10:33:21.847] Set global gas cap                       cap=50,000,000
INFO [03-31|10:33:21.850] Initializing the KZG library             backend=gokzg
INFO [03-31|10:33:21.919] Defaulting to pebble as the backing database
INFO [03-31|10:33:21.919] Allocated cache and file handles         database=/home/ubuntu/Deskt
op/private_ethereum_setup/node1/geth/chaindata cache=16.00MiB handles=16
INFO [03-31|10:33:21.942] Opened ancient database                  database=/home/ubuntu/Deskt
op/private_ethereum_setup/node1/geth/chaindata/ancient/chain readonly=false
INFO [03-31|10:33:21.943] State schema set to default              scheme=hash
INFO [03-31|10:33:21.943] Writing custom genesis block
INFO [03-31|10:33:21.945] Persisted trie from memory database      nodes=4 size=480.00B time="
609.399µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=0 livesize=0.00B
INFO [03-31|10:33:21.953] Successfully wrote genesis state         database=chaindata hash=c63
8fa..fe1846
INFO [03-31|10:33:21.953] Defaulting to pebble as the backing database
INFO [03-31|10:33:21.953] Allocated cache and file handles         database=/home/ubuntu/Deskt
op/private_ethereum_setup/node1/geth/lightchaindata cache=16.00MiB handles=16
INFO [03-31|10:33:21.962] Opened ancient database                  database=/home/ubuntu/Deskt
op/private_ethereum_setup/node1/geth/lightchaindata/ancient/chain readonly=false
INFO [03-31|10:33:21.962] State schema set to default              scheme=hash
INFO [03-31|10:33:21.963] Writing custom genesis block
INFO [03-31|10:33:21.964] Persisted trie from memory database      nodes=4 size=480.00B time="
811.122µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=0 livesize=0.00B
INFO [03-31|10:33:21.969] Successfully wrote genesis state         database=lightchaindata has
h=c638fa..fe1846
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ S
```

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ geth --datadir node2 init genesis.json
INFO [03-31|10:33:56.477] Maximum peer count                       ETH=50 total=50
INFO [03-31|10:33:56.479] Smartcard socket not found, disabling    err="stat /run/pcscd/pcscd.
comm: no such file or directory"
INFO [03-31|10:33:56.485] Set global gas cap                       cap=50,000,000
INFO [03-31|10:33:56.486] Initializing the KZG library             backend=gokzg
INFO [03-31|10:33:56.571] Defaulting to pebble as the backing database
INFO [03-31|10:33:56.571] Allocated cache and file handles         database=/home/ubuntu/Deskt
op/private_ethereum_setup/node2/geth/chaindata cache=16.00MiB handles=16
INFO [03-31|10:33:56.583] Opened ancient database                  database=/home/ubuntu/Deskt
op/private_ethereum_setup/node2/geth/chaindata/ancient/chain readonly=false
INFO [03-31|10:33:56.583] State schema set to default              scheme=hash
INFO [03-31|10:33:56.583] Writing custom genesis block
INFO [03-31|10:33:56.584] Persisted trie from memory database      nodes=4 size=480.00B time="
695.266µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=0 livesize=0.00B
INFO [03-31|10:33:56.590] Successfully wrote genesis state         database=chaindata hash=c63
8fa..fe1846
INFO [03-31|10:33:56.590] Defaulting to pebble as the backing database
INFO [03-31|10:33:56.590] Allocated cache and file handles         database=/home/ubuntu/Deskt
op/private_ethereum_setup/node2/geth/lightchaindata cache=16.00MiB handles=16
INFO [03-31|10:33:56.602] Opened ancient database                  database=/home/ubuntu/Deskt
op/private_ethereum_setup/node2/geth/lightchaindata/ancient/chain readonly=false
INFO [03-31|10:33:56.602] State schema set to default              scheme=hash
INFO [03-31|10:33:56.602] Writing custom genesis block
INFO [03-31|10:33:56.603] Persisted trie from memory database      nodes=4 size=480.00B time="
549.872µs" gcnodes=0 gcsize=0.00B gctime=0s livenodes=0 livesize=0.00B
INFO [03-31|10:33:56.609] Successfully wrote genesis state         database=lightchaindata has
h=c638fa..fe1846
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$
```

6. For configuring the boot node

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ sudo apt-get install bootnode
[sudo] password for ubuntu:
Sorry, try again.
[sudo] password for ubuntu:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
bootnode is already the newest version (1.13.14+build29502+jammy).
bootnode set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 231 not upgraded.
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$
```

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ bootnode -genkey boot.key
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ bootnode -nodekey boot.key
enode://fbbb379450b32a560c1adbc01f89cd7bf7434c64d3d61140e35f01e4dc6872e079e610606a8127a161a0ed
9d7be778636b22552290f7aaabad2e8232ed823eee@127.0.0.1:0?discport=30301
Note: you're using cmd/bootnode, a developer tool.
We recommend using a regular node as bootstrap node for production deployments.
INFO [03-31|10:35:18.634] New local node record                    seq=1,711,861,518,633 id=ba
197519c6e384da ip=<nil> udp=0 tcp=0
```

4. Step - 4: Establish a Peer-Peer Connection between the nodes along with the bootnode

1. On the first Terminal, Use boot.key to run the boot node

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ bootnode -verbosity 5 -nodekey boot.key -addr
127.0.0.1:30305
enode://fbbb379450b32a560c1adbc01f89cd7bf7434c64d3d61140e35f01e4dc6872e079e610606a8127a161a0e
9d7be778636b22552290f7aaabad2e8232ed823eee@127.0.0.1:0?discport=30305
Note: you're using cmd/bootnode, a developer tool.
We recommend using a regular node as bootstrap node for production deployments.
INFO [03-31|10:40:06.489] New local node record                    seq=1,711,861,806,489 id=ba
197519c6e384da ip=<nil> udp=0 tcp=0
```

2. On the second Terminal, Run Node 1

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ geth --datadir node1 --port 30306 --bootnodes enode://f7aba85ba369
923bffd3438b4c8fde6b1f02b1c23ea0aac825ed7eac38e6230e5cadcf868e73b0e28710f4c9f685ca71a86a4911461637ae9ab2bd852939b7
7f@127.0.0.1:0?discport=30305  --networkid 1234 --unlock 0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE --password "./
password.txt" --authrpc.port 8551 --mine --miner.etherbase 0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE
INFO [03-31|11:25:31.763] Maximum peer count                       ETH=50 LES=0 total=50
INFO [03-31|11:25:31.765] Smartcard socket not found, disabling    err="stat /run/pcscd/pcscd.comm: no such file o
r directory"
INFO [03-31|11:25:31.769] Set global gas cap                       cap=50,000,000
INFO [03-31|11:25:31.771] Allocated trie memory caches             clean=154.00MiB dirty=256.00MiB
INFO [03-31|11:25:31.771] Using pebble as the backing database
INFO [03-31|11:25:31.771] Allocated cache and file handles         database=/home/ubuntu/Desktop/private_ethereum_
setup/node1/geth/chaindata cache=512.00MiB handles=524,288
INFO [03-31|11:25:31.785] Opened ancient database                  database=/home/ubuntu/Desktop/private_ethereum_
setup/node1/geth/chaindata/ancient/chain readonly=false
INFO [03-31|11:25:31.792] Disk storage enabled for ethash caches   dir=/home/ubuntu/Desktop/private_ethereum_setup
/node1/geth/ethash count=3
INFO [03-31|11:25:31.796] Disk storage enabled for ethash DAGs     dir=/home/ubuntu/.ethash count=2
INFO [03-31|11:25:31.797] Initialising Ethereum protocol           network=1234 dbversion=8
INFO [03-31|11:25:31.797]
INFO [03-31|11:25:31.797] ------------------------------------------------------------------------------------------
------------------------------------------------------------
INFO [03-31|11:25:31.797] Chain ID:  1234 (unknown)
INFO [03-31|11:25:31.797] Consensus: Ethash (proof-of-work)
INFO [03-31|11:25:31.797]
INFO [03-31|11:25:31.797] Pre-Merge hard forks (block based):
INFO [03-31|11:25:31.797]  - Homestead:                    #0       (https://github.com/ethereum/execution-specs/b
lob/master/network-upgrades/mainnet-upgrades/homestead.md)
INFO [03-31|11:25:31.797]  - Tangerine Whistle (EIP 150): #0       (https://github.com/ethereum/execution-specs/b
lob/master/network-upgrades/mainnet-upgrades/tangerine-whistle.md)
INFO [03-31|11:25:31.797]  - Spurious Dragon/1 (EIP 155): #0       (https://github.com/ethereum/execution-specs/b
lob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [03-31|11:25:31.797]  - Spurious Dragon/2 (EIP 158): #0       (https://github.com/ethereum/execution-specs/b
```

```
ubuntu@ubuntu: ~/Desktop/private_ethereum_setup   ubuntu@ubuntu: ~/Desktop/private_ethereum_setup
ll>
TRACE[03-31|11:27:49.599] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:50.100] << FINDNODE/v4                           id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:50.100] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:50.601] << FINDNODE/v4                           id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:50.601] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:51.102] << FINDNODE/v4                           id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:51.102] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:51.602] << FINDNODE/v4                           id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:51.602] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:51.625] << PONG/v4                               id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:51.625] >> PING/v4                               id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
DEBUG[03-31|11:27:51.625] Revalidated node                         b=16 id=1af3a1e4b66753ff checks=2
TRACE[03-31|11:27:52.103] << FINDNODE/v4                           id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:52.104] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:52.604] << FINDNODE/v4                           id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:52.604] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:53.105] << FINDNODE/v4                           id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
TRACE[03-31|11:27:53.105] >> NEIGHBORS/v4                          id=1af3a1e4b66753ff addr=127.0.0.1:30306 err=<n
ll>
```

3. On the third Terminal, Run Node 2

```
ubuntu@ubuntu:~/Desktop/private_ethereum_setup$ geth --datadir node2 --port 30307 --bootnodes enode://f7aba85ba369
923bffd3438b4c8fde6b1f02b1c23ea0aac825ed7eac38e6230e5cadcf868e73b0e28710f4c9f685ca71a86a4911461637ae9ab2bd852939b7
7f@127.0.0.1:0?discport=30305  --networkid 1234 --keystore "./node2/keystore" --unlock 0xfc09dce1AB0Fe679e5cC09D88
B3E99de13864433 --password "./password.txt" console
INFO [03-31|11:56:49.157] Maximum peer count                       ETH=50 LES=0 total=50
INFO [03-31|11:56:49.159] Smartcard socket not found, disabling    err="stat /run/pcscd/pcscd.comm: no such file o
r directory"
INFO [03-31|11:56:49.164] Set global gas cap                       cap=50,000,000
INFO [03-31|11:56:49.167] Allocated trie memory caches             clean=154.00MiB dirty=256.00MiB
INFO [03-31|11:56:49.167] Using pebble as the backing database
INFO [03-31|11:56:49.167] Allocated cache and file handles         database=/home/ubuntu/Desktop/private_ethereum_
setup/node2/geth/chaindata cache=512.00MiB handles=524,288
INFO [03-31|11:56:49.192] Opened ancient database                  database=/home/ubuntu/Desktop/private_ethereum_
setup/node2/geth/chaindata/ancient/chain readonly=false
INFO [03-31|11:56:49.202] Disk storage enabled for ethash caches   dir=/home/ubuntu/Desktop/private_ethereum_setup
/node2/geth/ethash count=3
INFO [03-31|11:56:49.202] Disk storage enabled for ethash DAGs     dir=/home/ubuntu/.ethash count=2
INFO [03-31|11:56:49.203] Initialising Ethereum protocol           network=1234 dbversion=8
INFO [03-31|11:56:49.204]
INFO [03-31|11:56:49.204] ------------------------------------------------------------------------------------
----------------------------------------------------------
INFO [03-31|11:56:49.204] Chain ID:  1234 (unknown)
INFO [03-31|11:56:49.205] Consensus: Ethash (proof-of-work)
INFO [03-31|11:56:49.205]
INFO [03-31|11:56:49.205] Pre-Merge hard forks (block based):
INFO [03-31|11:56:49.205]  - Homestead:                    #0        (https://github.com/ethereum/execution-specs/b
lob/master/network-upgrades/mainnet-upgrades/homestead.md)
INFO [03-31|11:56:49.205]  - Tangerine Whistle (EIP 150): #0        (https://github.com/ethereum/execution-specs/b
```

5. Step - 5 : Exploring the network by attaching JavaScript console to Node 1

1. Fetch network status

```
> net
{
  listening: true,
  peerCount: 1,
  version: "1234",
  getListening: function(callback),
  getPeerCount: function(callback),
  getVersion: function(callback)
}
```

2. To fetch the number of blocks mined

```
> web3.eth.blockNumber
0
> INFO [03-23|12:15:29.133] Looking for peers                          peercount=1
 tried=0 static=0
```

3. To check the balance of the accounts

```
entage=72 elapsed=6m42.768s
> eth.getBalance(eth.accounts[0])
1.000322e+24
> INFO [03-31|12:09:54.727] Generating DAG in progress
```

4. To fetch the details of the latest mined block

```
> eth.getBlock("latest")
{
  difficulty: 141501,
  extraData: "0xd883010b068467657468888676f312e32302e33856c696e7578",
  gasLimit: 114681864,
  gasUsed: 0,
  hash: "0x971fd7f7cada2a9922fad1ea258680d8b47aeb76858c0e2e1c668088af95dd46",
  logsBloom: "0x000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000",
  miner: "0x9f9497c56b54890fd2f693bac26c71e4736eb2be",
  mixHash: "0x04711352f8591ce3fe869586e2d889e92a2affa5f30d66d81d2394655fac5eed",
  nonce: "0x074eaadf2f84ee20",
  number: 161,
  parentHash: "0x4bb099d8e334270cdfd4f9014a81c05fec8e5b5d690236a6c3c3de27fe945a0e",
  receiptsRoot: "0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421",
  sha3Uncles: "0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347",
  size: 538,
  stateRoot: "0x3c5c06751cbcf16f9ce7a8ae4a7593bece60d735f93c9573d92c8082cb678f33",
  timestamp: 1711867051,
  totalDifficulty: 21944603,
  transactions: [],
  transactionsRoot: "0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421",
  uncles: []
}
>
```

5. To fetch the details of a specific block

```
> eth.getBlock(100)
{
  difficulty: 137447,
  extraData: "0xd883010b068467657468886766f312e32302e33856c696e7578",
  gasLimit: 121724529,
  gasUsed: 0,
  hash: "0x70d88d2e2b6adbc5f77a303047feab3860428d9cf767be8a1ed614a056901a57",
  logsBloom: "0x000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000",
  miner: "0x9f9497c56b54890fd2f693bac26c71e4736eb2be",
  mixHash: "0xb0dd82c44a786d1a23d3cd2e1c7951e30cafe30ed469fc1af7b7b4410ac24d1c",
  nonce: "0x284e830e78c6a90e",
  number: 100,
  parentHash: "0x4ddc65426bffb820125bb925968d6268d30c933ff67991080ffbca37a9510cbc",
  receiptsRoot: "0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421",
  sha3Uncles: "0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347",
  size: 537,
  stateRoot: "0x5d295a7b8ada8718850a4676e054e6e2dea72b739a3b2e4a4233b8be9243dea8",
  timestamp: 1711866955,
  totalDifficulty: 13436860,
  transactions: [],
  transactionsRoot: "0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cadc001622fb5e363b421",
  uncles: []
}
> INFO [03-31|12:12:07.308] Looking for peers                        peercount=1 tried=0 static=0
INFO [03-31|12:12:17.326] Looking for peers                        peercount=1 tried=0 static=0
```

6. To check the account balance of the peer machine, provide their Public Key

```
> eth.getBalance("0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE")
1.000322e+24
> INFO [03-31|12:13:17.464] Looking for peers
>
```

7. Fetch the details of the peers in the network

```
> admin.peers
[{
    caps: ["eth/66", "eth/67", "eth/68", "snap/1"],
    enode: "enode://dce739f3f2fae54667568d84488b8d055409c862e80d78d653bf086b250ddd431fa6c6342502f9ff8f99129b5ee0
55679fabc9335a9049ec7ae1b13941bb265e@127.0.0.1:30307",
    id: "ebf13aa79411d6e216f71bee7625c7391e7a2049d3853aed09ffb5566981dc27",
    name: "Geth/v1.11.6-stable-ea9e62ca/linux-amd64/go1.20.3",
    network: {
      inbound: false,
      localAddress: "127.0.0.1:36900",
      remoteAddress: "127.0.0.1:30307",
      static: false,
      trusted: false
    },
    protocols: {
      eth: {
        version: 68
      },
      snap: {
        version: 1
      }
    }
}]
```

8. Perform Transactions between peers in the network

```
> eth.sendTransaction({from:"0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE",to:"0xfc09dce1AB0Fe679e5cC09D88B3E99de1
3864433"})
WARN [03-31|12:16:19.599] Caller gas above allowance, capping      requested=114,569,871 cap=50,000,000
INFO [03-31|12:16:19.617] Setting new local account                address=0x9F9497c56b54890fD2F693BaC26C71e4736
eb2bE
INFO [03-31|12:16:19.619] Submitted transaction                    hash=0xf2c1e10c56397e2726e94bc166405b3ff0863d
e4757b479a1b6812debe56f33f from=0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE nonce=0 recipient=0xfc09dce1AB0Fe679e
5cC09D88B3E99de13864433 value=0
"0xf2c1e10c56397e2726e94bc166405b3ff0863de4757b479a1b6812debe56f33f"
> INFO [03-31|12:16:27.814] Looking for peers                        peercount=1 tried=0 static=0
```

9. Check the balances of sender and receiver 2

```
> eth.getBalance("0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE")

1.000322e+24
```

10. To check the details of the transaction on Node 1 Terminal

```
> eth.getTransaction("0xe181e503b93f95f2e69553091fbdd8459eda0942662c68ead0c5492779cf31c7")
{
  blockHash: null,
  blockNumber: null,
  chainId: "0x4d2",
  from: "0x9f9497c56b54890fd2f693bac26c71e4736eb2be",
  gas: 21000,
  gasPrice: 1000000000,
  hash: "0xe181e503b93f95f2e69553091fbdd8459eda0942662c68ead0c5492779cf31c7",
  input: "0x",
  nonce: 4,
  r: "0xd7bb1c00265f84c46d3c4fbf9ed8228eb791fb0e0303f1d2098989bfed21ecd1",
  s: "0x676eb39f0310ac550aeed7bade8f2988b99e64fcbcbe743cf91d2d889298c6d9",
  to: "0xfc09dce1ab0fe679e5cc09d88b3e99de13864433",
  transactionIndex: null,
  type: "0x0",
  v: "0x9c7",
  value: 90009000
}
> INFO [03-31|12:19:48.198] Looking for peers                        peercount=1 tried=0 static=0
> INFO [03-31|12:19:58.215] Looking for peers                        peercount=1 tried=0 static=0
```

11. To check the contents in the Mempool - Transaction Pool

```
> txpool.content
{
  pending: {
    0x9F9497c56b54890fD2F693BaC26C71e4736eb2bE: {
      0: {
        blockHash: null,
        blockNumber: null,
        chainId: "0x4d2",
        from: "0x9f9497c56b54890fd2f693bac26c71e4736eb2be",
        gas: "0x5208",
        gasPrice: "0x3b9aca00",
        hash: "0xf2c1e10c56397e2726e94bc166405b3ff0863de4757b479a1b6812debe56f33f",
        input: "0x",
        nonce: "0x0",
        r: "0xfe80302530833e03cb38f654004a63d2b812eeab0d15ac0c743c02959e32b17e",
        s: "0x532a68167bf51184d46643bc35d828d941fc9a75a043b4b37010a7409cb41f1c",
        to: "0xfc09dce1ab0fe679e5cc09d88b3e99de13864433",
        transactionIndex: null,
        type: "0x0",
        v: "0x9c8",
        value: "0x0"
      },
      1: {
        blockHash: null,
        blockNumber: null,
        chainId: "0x4d2",
        from: "0x9f9497c56b54890fd2f693bac26c71e4736eb2be",
        gas: "0x5208",
        gasPrice: "0x3b9aca00",
        hash: "0xdde43d6b52e779b78d33a4e5c311ce24b71fc7c7434c93464d662ce20f81ec3c",
        input: "0x",
        nonce: "0x1",
        r: "0xa1abb8a85a39d5da37ac14f8275a2eb5034e8182bd4cfa7b3523d631020188f3",
        s: "0xfb96f3fb07299f86289f4a30805b0872a36b091f9c9c65e577de70adb609e11",
        to: "0xfc09dce1ab0fe679e5cc09d88b3e99de13864433",
        transactionIndex: null,
```

12. To check the status of the Mempool - Transaction Pool

```
> txpool.status
{
  pending: 5,
  queued: 0
}
> INFO [03-31|12:21:38.389] Looking for peers                        peercount=1 tried=0 static=0
```