

**TP : Création et configuration d'une  
Blockchain Privée Ethereum**

**KASDI ANTHENEA**

**A3MSI**

## **I. Installation d'Ethereum sur Ubuntu (Linux recommandé)**

The screenshot shows a terminal window titled "VM Ubuntu [Running] - Oracle VM VirtualBox". The terminal output is as follows:

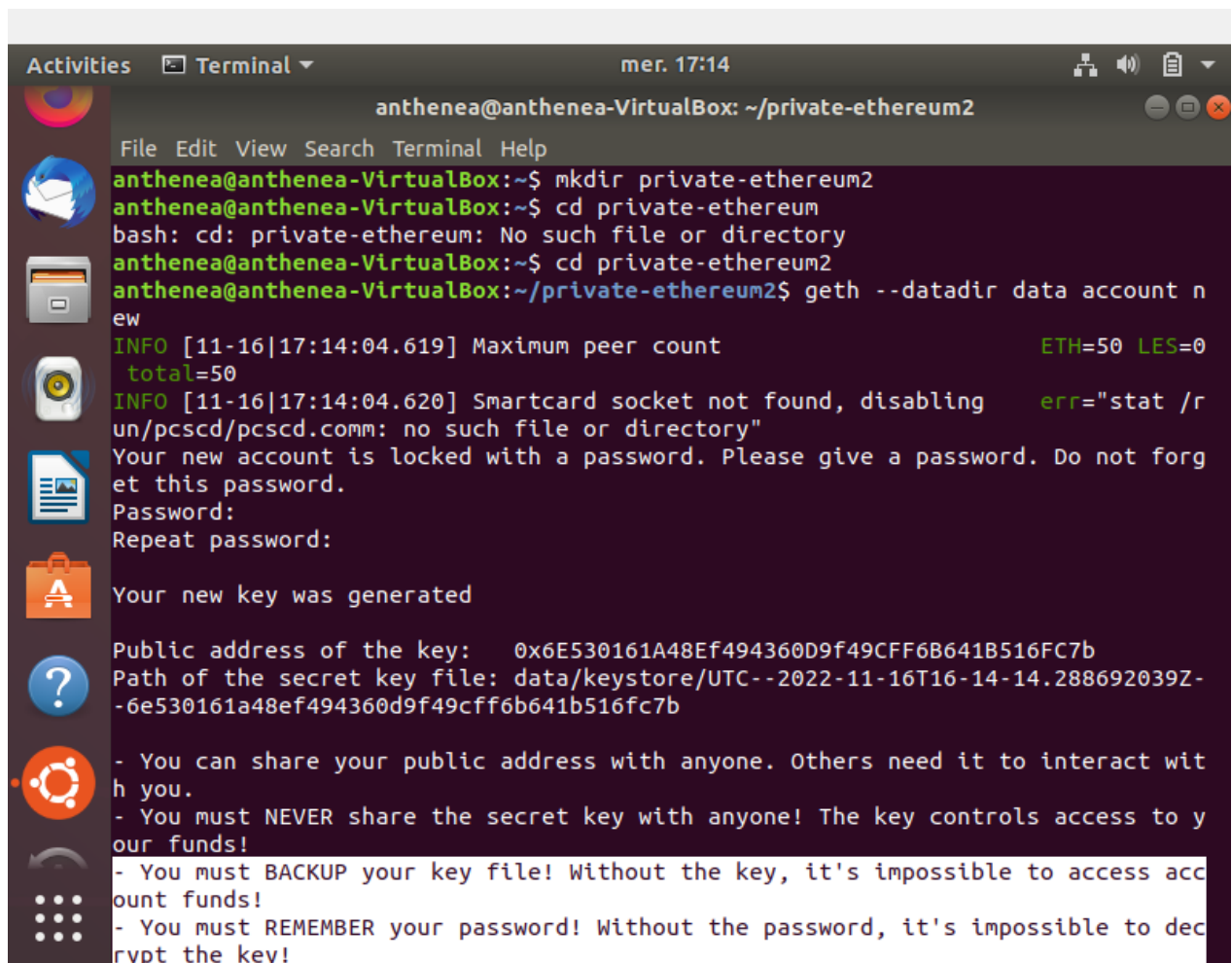
```

anthenea@anthenea-VirtualBox: ~
File Edit View Search Terminal Help

Processing triggers for install-info (6.5.0.dfsg.1-2) ...
anthenea@anthenea-VirtualBox:~$ sudo apt-get install libjsonrpcpp-dev -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libargtable2-0 libcurl4-openssl-dev libjsonrpcpp-client0
  libjsonrpcpp-common0 libjsonrpcpp-server0 libjsonrpcpp-stub0
Suggested packages:
  libcurl4-doc libidn11-dev libkrb5-dev libldap2-dev librtmp-dev
  libssh2-1-dev libssl-dev pkg-config libjsonrpcpp-tools
The following packages will be REMOVED:
  libcurl4-gnutls-dev
The following NEW packages will be installed:
  libargtable2-0 libcurl4-openssl-dev libjsonrpcpp-client0
  libjsonrpcpp-common0 libjsonrpcpp-dev libjsonrpcpp-server0
  libjsonrpcpp-stub0
0 upgraded, 7 newly installed, 1 to remove and 244 not upgraded.
Need to get 496 kB of archives.
After this operation, 980 kB of additional disk space will be used.
Get:1 http://fr.archive.ubuntu.com/ubuntu bionic/universe amd64 libargtable2-0
amd64 13-1 [13,6 kB]
Get:2 http://fr.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libcurl4-op
enssl-dev amd64 7.58.0-2ubuntu3.21 [302 kB]
Get:3 http://fr.archive.ubuntu.com/ubuntu bionic/universe amd64 libjsonrpcpp-c
ommon0 amd64 0.7.0-1build2 [24,5 kB]
Get:4 http://fr.archive.ubuntu.com/ubuntu bionic/universe amd64 libjsonrpcpp-c
lient0 amd64 0.7.0-1build2 [20,4 kB]
Get:5 http://fr.archive.ubuntu.com/ubuntu bionic/universe amd64 libjsonrpcpp-s

```





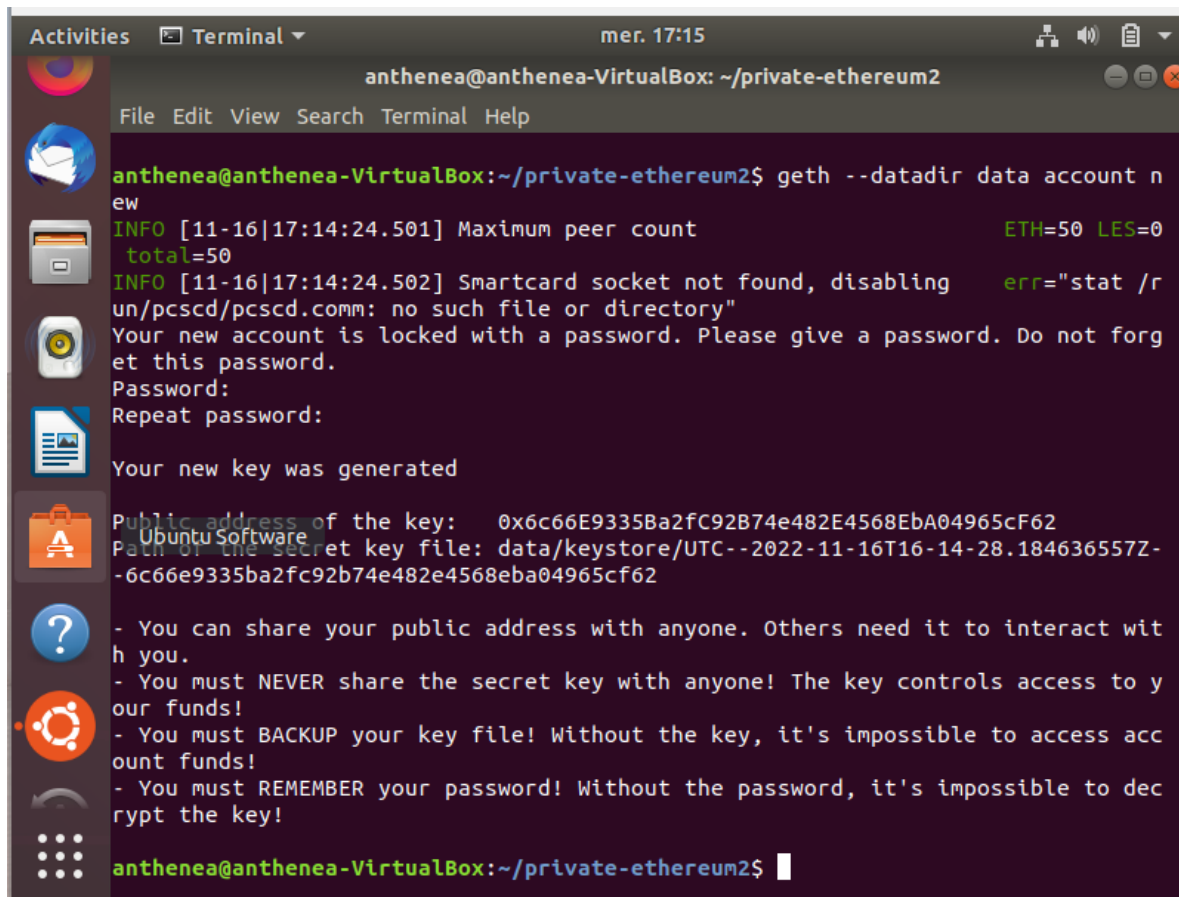
The screenshot shows a terminal window titled "anthenea@anthenea-VirtualBox: ~/private-ethereum2". The user has created a directory "private-ethereum2", navigated into it, and run the command "geth --datadir data account new". The terminal output shows the account creation process, including a warning about the smartcard socket, a password prompt, and the generation of a new key. The public address and the path to the secret key file are displayed. A list of instructions follows, emphasizing the importance of sharing the public address, never sharing the secret key, backing up the key file, and remembering the password.

```
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
anthenea@anthenea-VirtualBox:~$ mkdir private-ethereum2
anthenea@anthenea-VirtualBox:~$ cd private-ethereum
bash: cd: private-ethereum: No such file or directory
anthenea@anthenea-VirtualBox:~$ cd private-ethereum2
anthenea@anthenea-VirtualBox:~/private-ethereum2$ geth --datadir data account new
INFO [11-16|17:14:04.619] Maximum peer count          ETH=50 LES=0 total=50
INFO [11-16|17:14:04.620] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:
Your new key was generated

Public address of the key: 0x6E530161A48Ef494360D9f49CFF6B641B516FC7b
Path of the secret key file: data/keystore/UTC--2022-11-16T16-14-14.288692039Z--6e530161a48ef494360d9f49cff6b641b516fc7b

- 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!
```

Création du deuxième compte à l'aide de la même commande :



```
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help

anthenea@anthenea-VirtualBox:~/private-ethereum2$ geth --datadir data account new
INFO [11-16|17:14:24.501] Maximum peer count          ETH=50 LES=0
total=50
INFO [11-16|17:14:24.502] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:
Your new key was generated

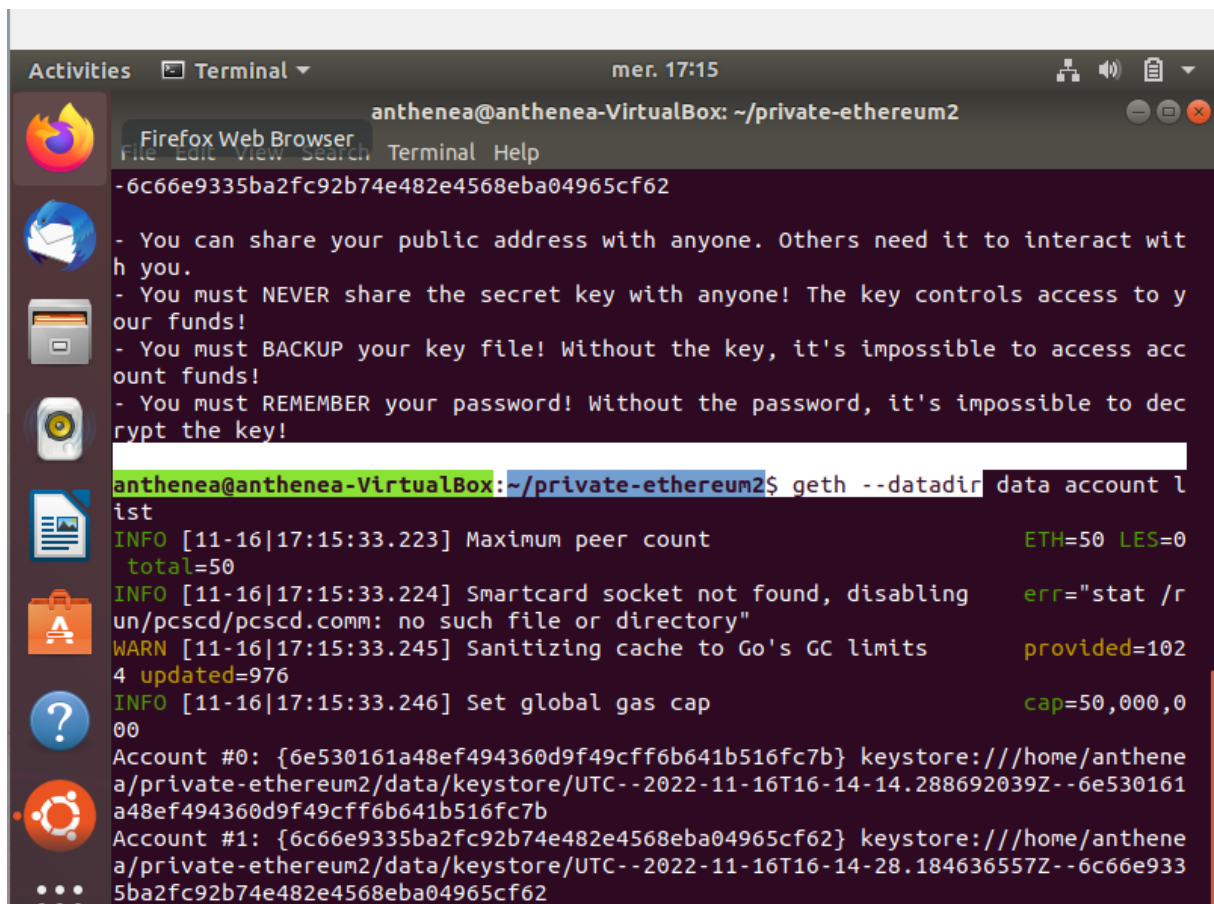
Public address of the key: 0x6c66E9335Ba2fc92B74e482E4568EbA04965cF62
Path of the secret key file: data/keystore/UTC--2022-11-16T16-14-28.184636557Z--6c66e9335ba2fc92b74e482e4568eba04965cf62

- 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!

anthenea@anthenea-VirtualBox:~/private-ethereum2$
```

Le mot de passe est nécessaire afin de bien réaliser ses transactions. Il agit comme une clé privée qui permet ainsi d'attester de son identité quand on reçoit ou envoie une transaction. Sans le mot de passe, il est impossible de permettre d'envoyer ou de recevoir des transactions. Il est donc indispensable.

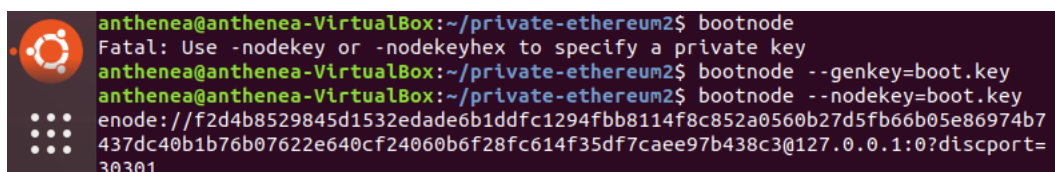
On vérifie que les deux comptes ont bien été créés à l'aide de la commande `geth --datadir data account list`, nous avons bien l'instanciation donnée sur le TP :



```
antheanea@antheanea-VirtualBox: ~/private-ethereum2
geth --datadir data account list
INFO [11-16|17:15:33.223] Maximum peer count          ETH=50 LES=0 total=50
INFO [11-16|17:15:33.224] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
WARN [11-16|17:15:33.245] Sanitizing cache to Go's GC limits provided=1024 updated=976
INFO [11-16|17:15:33.246] Set global gas cap          cap=50,000,000
Account #0: {6e530161a48ef494360d9f49cff6b641b516fc7b} keystore:///home/antheanea/private-ethereum2/data/keystore/UTC--2022-11-16T16-14-14.288692039Z--6e530161a48ef494360d9f49cff6b641b516fc7b
Account #1: {6c66e9335ba2fc92b74e482e4568eba04965cf62} keystore:///home/antheanea/private-ethereum2/data/keystore/UTC--2022-11-16T16-14-28.184636557Z--6c66e9335ba2fc92b74e482e4568eba04965cf62
```

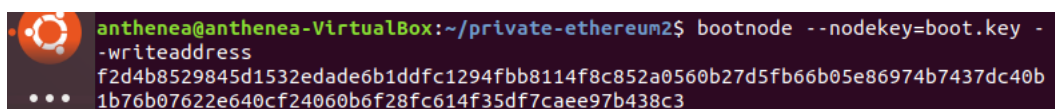
### III. Configuration du Bootnode uniquement sur le serveur dans un premier temps :

Commandes bootnodes :



```
antheanea@antheanea-VirtualBox:~/private-ethereum2$ bootnode
Fatal: Use -nodekey or -nodekeyhex to specify a private key
antheanea@antheanea-VirtualBox:~/private-ethereum2$ bootnode --genkey=boot.key
antheanea@antheanea-VirtualBox:~/private-ethereum2$ bootnode --nodekey=boot.key
enode://f2d4b8529845d1532edade6b1ddfc1294fbb8114f8c852a0560b27d5fb66b05e86974b7437dc40b1b76b07622e640cf24060b6f28fc614f35df7caee97b438c3@127.0.0.1:0?discport=30301
```

On vérifie que l'on possède bien bien la même adresse comme identifiant, nous avons bien la sortie indiquée sur le TP.

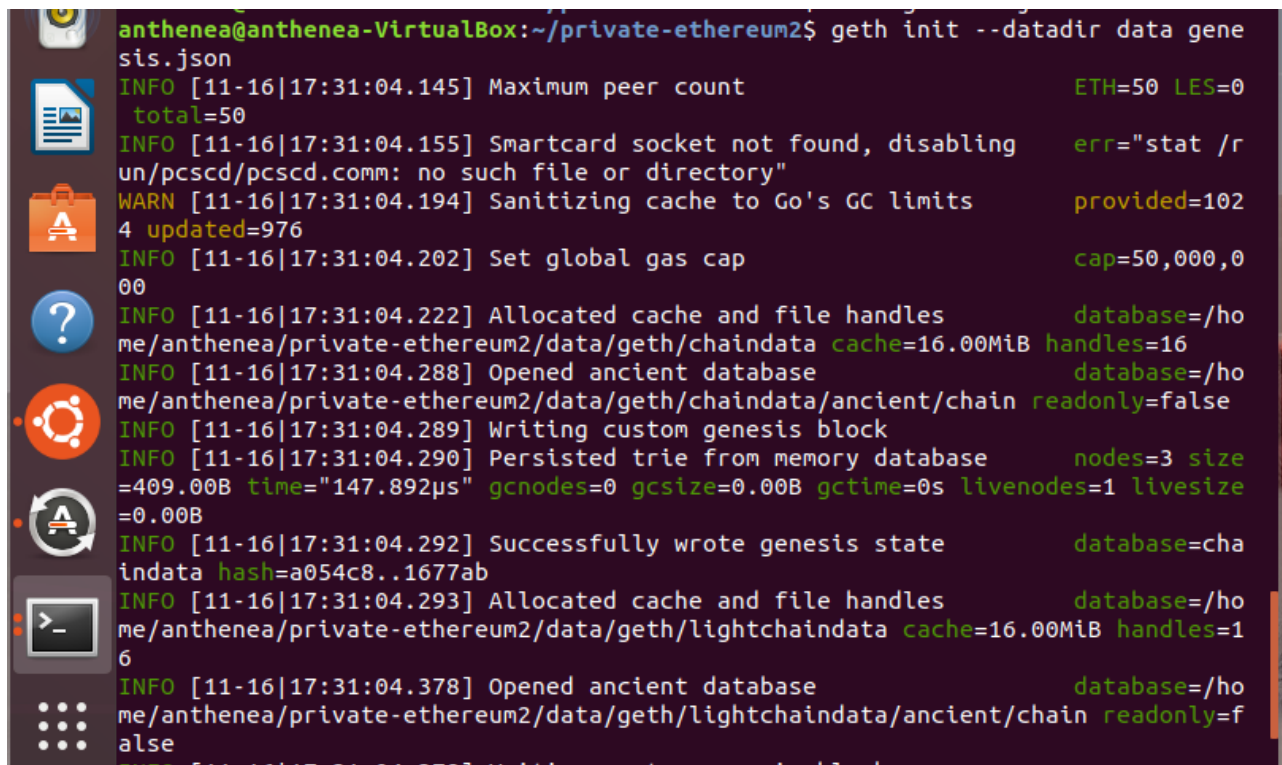


```
antheanea@antheanea-VirtualBox:~/private-ethereum2$ bootnode --nodekey=boot.key --writeaddress
f2d4b8529845d1532edade6b1ddfc1294fbb8114f8c852a0560b27d5fb66b05e86974b7437dc40b1b76b07622e640cf24060b6f28fc614f35df7caee97b438c3
```





Instanciation du répertoire de données grâce à la commande suivante : `geth init --datadir data genesis.json` :



```
anthenea@anthenea-VirtualBox:~/private-ethereum2$ geth init --datadir data gene
sis.json
INFO [11-16|17:31:04.145] Maximum peer count                ETH=50 LES=0
total=50
INFO [11-16|17:31:04.155] Smartcard socket not found, disabling err="stat /r
un/pcscd/pcscd.comm: no such file or directory"
WARN [11-16|17:31:04.194] Sanitizing cache to Go's GC limits provided=102
4 updated=976
INFO [11-16|17:31:04.202] Set global gas cap                cap=50,000,0
00
INFO [11-16|17:31:04.222] Allocated cache and file handles database=/ho
me/anthenea/private-ethereum2/data/geth/chaindata cache=16.00MiB handles=16
INFO [11-16|17:31:04.288] Opened ancient database           database=/ho
me/anthenea/private-ethereum2/data/geth/chaindata/ancient/chain readonly=false
INFO [11-16|17:31:04.289] Writing custom genesis block
INFO [11-16|17:31:04.290] Persisted trie from memory database nodes=3 size
=409.00B time="147.892µs" gcnodes=0 gcsz=0.00B gctime=0s livenodes=1 livesize
=0.00B
INFO [11-16|17:31:04.292] Successfully wrote genesis state database=cha
indata hash=a054c8..1677ab
INFO [11-16|17:31:04.293] Allocated cache and file handles database=/ho
me/anthenea/private-ethereum2/data/geth/lightchaindata cache=16.00MiB handles=1
6
INFO [11-16|17:31:04.378] Opened ancient database           database=/ho
me/anthenea/private-ethereum2/data/geth/lightchaindata/ancient/chain readonly=f
alse
INFO [11-16|17:31:04.379] Writing custom genesis block
```

## VI. Démarrage de vos nœuds sur les ordinateurs de vos camarades

En récupérant le enode du serveur nous lançons la commande `geth networkid` :

Nous voyons que les blocks sont bien en train d'être créés.



```
anthenea@anthenea-VirtualBox:~/private-ethereum2$ geth --networkid 12345678 --datadir data --bootnodes enode://f0c175d4ddf4432e3e915e4d5d1137f5073853a3d5ceeffe627a781a5dff1dc4f97412ba71dc1578ed29e2ee77aaa629c0eb33d65d0a970fabaa92c3691d19d8@64.225.66.111:30303
INFO [11-16|17:37:38.781] Maximum peer count ETH=50 LES=0 total=50
INFO [11-16|17:37:38.788] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
WARN [11-16|17:37:38.825] Sanitizing cache to Go's GC limits provided=1024 updated=976
INFO [11-16|17:37:38.827] Set global gas cap cap=50,000,000
INFO [11-16|17:37:38.844] Allocated trie memory caches clean=146.00MiB dirty=244.00MiB
INFO [11-16|17:37:38.845] Allocated cache and file handles database=/home/anthenea/private-ethereum2/data/geth/chaindata cache=488.00MiB handles=2048
INFO [11-16|17:37:38.942] Opened ancient database database=/home/anthenea/private-ethereum2/data/geth/chaindata/ancient/chaindata readonly=false
INFO [11-16|17:37:38.944]
INFO [11-16|17:37:38.945] -----
-----
INFO [11-16|17:37:38.945] Chain ID: 12345678 (unknown)
INFO [11-16|17:37:38.945] Consensus: Ethash (proof-of-work)
INFO [11-16|17:37:38.949]
INFO [11-16|17:37:38.949] Pre-Merge hard forks:
INFO [11-16|17:37:38.949] - Homestead: 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/homestead.md)
```

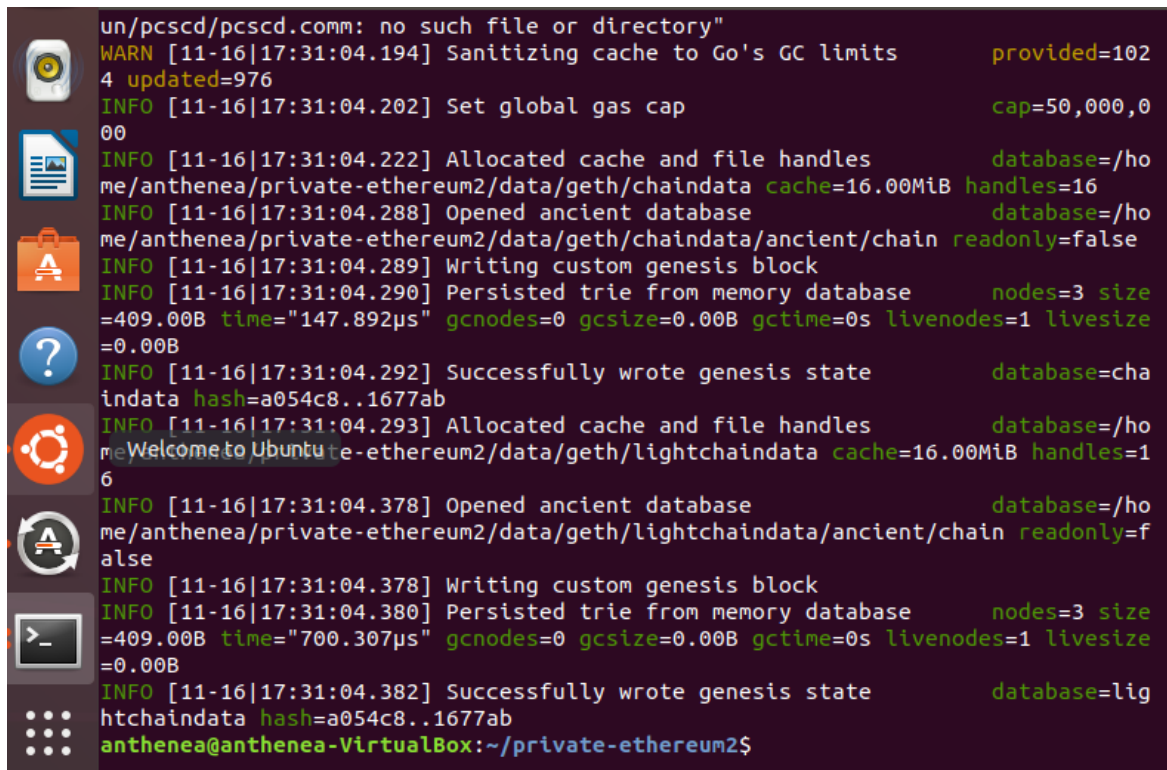
```
mer. 17:40
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
INFO [11-16|17:37:38.949] Pre-Merge hard forks:
INFO [11-16|17:37:38.949] - Homestead: 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/homestead.md)
INFO [11-16|17:37:38.949] - Tangerine Whistle (EIP 150): 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/tangerine-whistle.md)
INFO [11-16|17:37:38.949] - Spurious Dragon/1 (EIP 155): 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [11-16|17:37:38.950] - Spurious Dragon/2 (EIP 158): 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/spurious-dragon.md)
INFO [11-16|17:37:38.950] - Byzantium: 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/byzantium.md)
INFO [11-16|17:37:38.950] - Constantinople: 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/constantinople.md)
INFO [11-16|17:37:38.950] - Petersburg: 0 (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/petersburg.md)
INFO [11-16|17:37:38.950] - Istanbul: <nil> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/istanbul.md)
INFO [11-16|17:37:38.951] - Berlin: <nil> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/berlin.md)
INFO [11-16|17:37:38.951] - London: <nil> (https://github.com/ethereum/execution-specs/blob/master/network-upgrades/mainnet-upgrades/london.md)
```

```
Activities Terminal mer. 17:41
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
-----
INFO [11-16|17:37:38.952]
INFO [11-16|17:37:38.952] Disk storage enabled for ethash caches dir=/home/an
thenea/private-ethereum2/data/geth/ethash count=3
INFO [11-16|17:37:38.953] Disk storage enabled for ethash DAGs dir=/home/an
thenea/.ethash count=2
INFO [11-16|17:37:38.953] Initialising Ethereum protocol network=12,3
45,678 dbversion=<nil>
INFO [11-16|17:37:38.957] Loaded most recent local header number=0 has
h=a054c8..1677ab td=1 age=53y7mo3w
INFO [11-16|17:37:38.959] Loaded most recent local full block number=0 has
h=a054c8..1677ab td=1 age=53y7mo3w
INFO [11-16|17:37:38.959] Loaded most recent local fast block number=0 has
h=a054c8..1677ab td=1 age=53y7mo3w
WARN [11-16|17:37:38.960] Failed to load snapshot, regenerating err="missing
or corrupted snapshot"
INFO [11-16|17:37:38.961] Rebuilding state snapshot
INFO [11-16|17:37:38.962] Regenerated local transaction journal transactions
=0 accounts=0
INFO [11-16|17:37:38.965] Gasprice oracle is ignoring threshold set threshold=2
WARN [11-16|17:37:38.970] Error reading unclean shutdown markers error="level
db: not found"
WARN [11-16|17:37:38.970] Engine API enabled protocol=eth
WARN [11-16|17:37:38.970] Engine API started but chain not configured for merge
yet
INFO [11-16|17:37:38.971] Starting peer-to-peer node instance=Get
h/ShowApplications-e5eb32ac/linux-amd64/go1.18.5
INFO [11-16|17:37:38.968] Resuming state snapshot generation root=b23997.
```

```
Activities Terminal mer. 17:41
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
INFO [11-16|17:37:49.014] Looking for peers peercount=1
tried=137 static=0
INFO [11-16|17:37:49.022] Block synchronisation started
INFO [11-16|17:37:49.668] State sync in progress synced=37.26
% state=196.00B accounts=1@196.00B slots=0@0.00B codes=0@0.00B eta=328.620ms
INFO [11-16|17:37:50.029] State sync in progress synced=100.0
0% state=392.00B accounts=2@392.00B slots=0@0.00B codes=0@0.00B eta=-121ns
INFO [11-16|17:37:50.029] State heal in progress accounts=0@0
.00B slots=0@0.00B codes=0@0.00B nodes=0@0.00B pending=0
INFO [11-16|17:37:52.785] Imported new block headers count=50 ela
psed=3.239s number=50 hash=420aa3..3eb810 age=1w3d22h
INFO [11-16|17:37:52.786] Downloader queue stats receiptTasks
=0 blockTasks=0 itemSize=576.88B throttle=8192
INFO [11-16|17:37:53.751] Imported new chain segment blocks=50 tx
s=0 mgas=0.000 elapsed=963.963ms mgasps=0.000 number=50 hash=420aa3..3eb810 age
=1w3d22h dirty=22.17KiB
INFO [11-16|17:37:55.867] Imported new block headers count=2 ela
psed=88.442ms number=52 hash=84f992..be4616 age=1w3d22h
INFO [11-16|17:37:56.025] Imported new chain segment blocks=2 tx
s=0 mgas=0.000 elapsed=156.110ms mgasps=0.000 number=52 hash=84f992..be4616 age
=1w3d22h dirty=23.05KiB
INFO [11-16|17:37:56.029] Snap sync complete, auto disabling
INFO [11-16|17:37:59.189] Looking for peers peercount=1
tried=147 static=0
INFO [11-16|17:38:10.536] Looking for peers peercount=1
tried=126 static=0
```

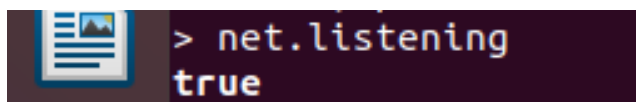
```
Activities Terminal mer. 17:41
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
INFO [11-16|17:37:59.189] Looking for peers peercount=1
tried=147 static=0
INFO [11-16|17:38:10.536] Looking for peers peercount=1
tried=126 static=0
INFO [11-16|17:38:20.748] Looking for peers peercount=2
tried=155 static=0
INFO [11-16|17:38:30.749] Looking for peers peercount=1
tried=105 static=0
WARN [11-16|17:38:33.028] Snapshot extension registration failed peer=70d956b
8 err="peer connected on snap without compatible eth support"
INFO [11-16|17:38:51.134] Looking for peers peercount=1
tried=119 static=0
INFO [11-16|17:39:01.467] Looking for peers peercount=1
tried=99 static=0
WARN [11-16|17:39:22.707] Snapshot extension registration failed peer=6ec80bb
f err="peer connected on snap without compatible eth support"
WARN [11-16|17:39:30.705] Snapshot extension registration failed peer=7bcee16
b err="peer connected on snap without compatible eth support"
INFO [11-16|17:39:31.499] Looking for peers peercount=2
tried=166 static=0
INFO [11-16|17:39:41.712] Looking for peers peercount=1
tried=84 static=0
INFO [11-16|17:39:52.455] Looking for peers peercount=1
tried=114 static=0
INFO [11-16|17:40:02.474] Looking for peers peercount=1
tried=94 static=0
INFO [11-16|17:40:12.514] Looking for peers peercount=1
tried=118 static=0
INFO [11-16|17:40:22.528] Looking for peers peercount=1
```

```
Activities Terminal mer. 17:42
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
tried=166 static=0
INFO [11-16|17:39:41.712] Looking for peers peercount=1
t Thunderbird Mail _=0
INFO [11-16|17:39:52.455] Looking for peers peercount=1
tried=114 static=0
INFO [11-16|17:40:02.474] Looking for peers peercount=1
tried=94 static=0
INFO [11-16|17:40:12.514] Looking for peers peercount=1
tried=118 static=0
INFO [11-16|17:40:22.528] Looking for peers peercount=1
tried=205 static=0
INFO [11-16|17:40:32.615] Looking for peers peercount=1
tried=76 static=0
INFO [11-16|17:40:42.626] Looking for peers peercount=1
tried=124 static=0
INFO [11-16|17:40:52.846] Looking for peers peercount=2
tried=216 static=0
INFO [11-16|17:41:02.857] Looking for peers peercount=1
tried=16 static=0
INFO [11-16|17:41:22.921] Looking for peers peercount=2
tried=160 static=0
INFO [11-16|17:41:33.322] Looking for peers peercount=1
tried=121 static=0
INFO [11-16|17:41:43.788] Looking for peers peercount=1
tried=134 static=0
WARN [11-16|17:41:52.923] Snapshot extension registration failed peer=7bcee16
b err="peer connected on snap without compatible eth support"
```

A terminal window with a dark purple background and white text. On the left side, there is a vertical bar containing several icons: a hard drive, a document, a shopping bag, a question mark, a circular arrow, a terminal window, and a grid of dots. The terminal output shows the following logs:

```
un/pcscd/pcscd.comm: no such file or directory"
WARN [11-16|17:31:04.194] Sanitizing cache to Go's GC limits      provided=1024 updated=976
INFO [11-16|17:31:04.202] Set global gas cap      cap=50,000,000
INFO [11-16|17:31:04.222] Allocated cache and file handles      database=/home/anthenea/private-ethereum2/data/eth/chaindata cache=16.00MiB handles=16
INFO [11-16|17:31:04.288] Opened ancient database      database=/home/anthenea/private-ethereum2/data/eth/chaindata/ancient/chaindata readonly=false
INFO [11-16|17:31:04.289] Writing custom genesis block
INFO [11-16|17:31:04.290] Persisted trie from memory database    nodes=3 size=409.00B time="147.892µs" gcnodes=0 gcsz=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [11-16|17:31:04.292] Successfully wrote genesis state      database=chaindata hash=a054c8..1677ab
INFO [11-16|17:31:04.293] Allocated cache and file handles      database=/home/anthenea/private-ethereum2/data/eth/lightchaindata cache=16.00MiB handles=16
INFO [11-16|17:31:04.378] Opened ancient database      database=/home/anthenea/private-ethereum2/data/eth/lightchaindata/ancient/chaindata readonly=false
INFO [11-16|17:31:04.378] Writing custom genesis block
INFO [11-16|17:31:04.380] Persisted trie from memory database    nodes=3 size=409.00B time="700.307µs" gcnodes=0 gcsz=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [11-16|17:31:04.382] Successfully wrote genesis state      database=lightchaindata hash=a054c8..1677ab
anthenea@anthenea-VirtualBox:~/private-ethereum2$
```

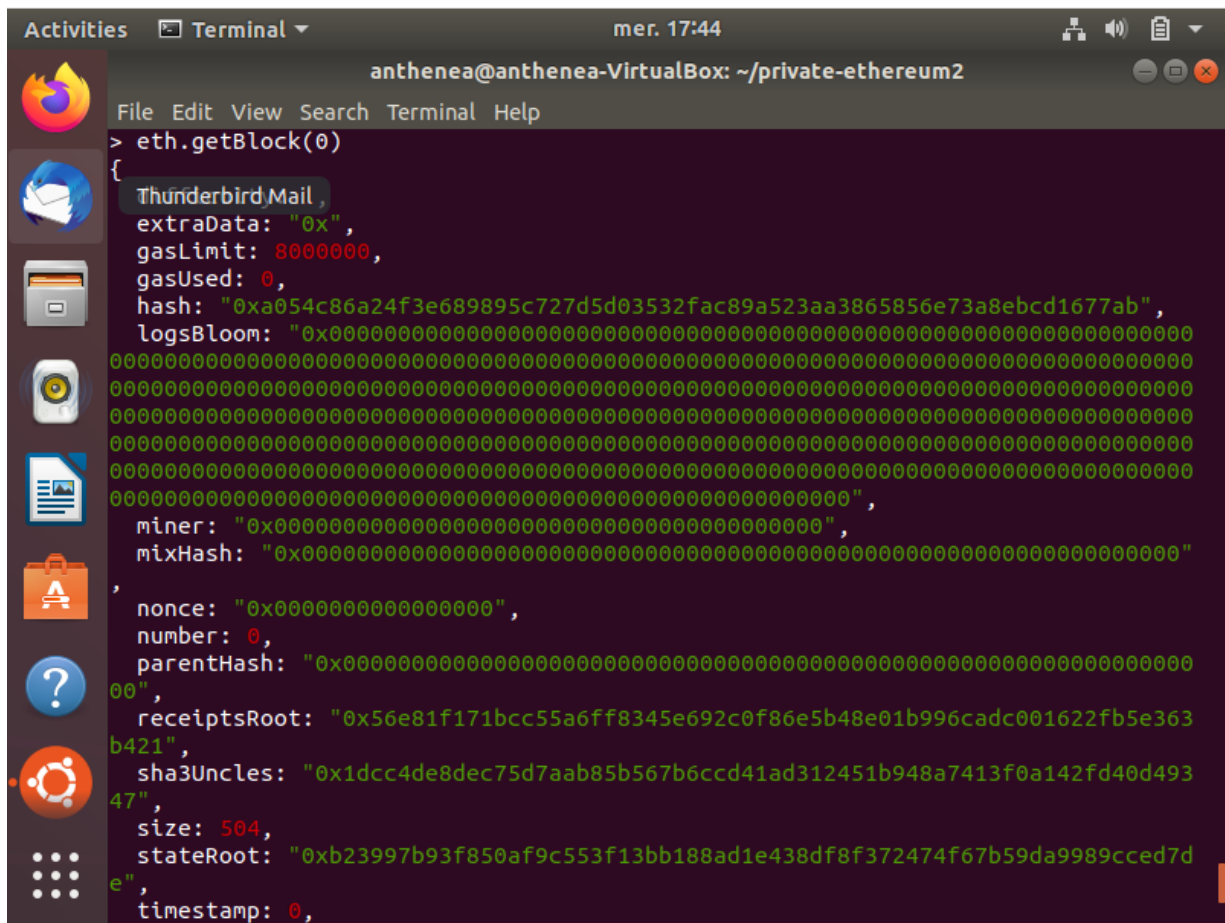
Puis dans la console on réalise la commande suivante pour écouter tous les ports : `net.listening`

A small terminal snippet showing the command `> net.listening` followed by the output `true` on a dark purple background.

Vérifions que le 1er block créé est le même que celui du serveur grâce à la commande `eth.getBlock(0)`

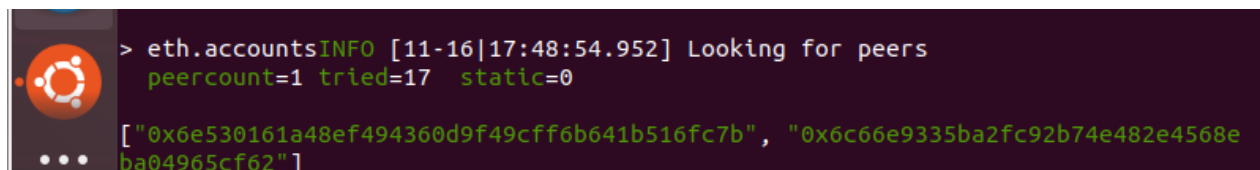
Nous sommes donc bien synchronisés au serveur.





```
Activities Terminal mer. 17:44
anthenea@anthenea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
> eth.getBlock(0)
{
  "number": 0,
  "hash": "0xa054c86a24f3e689895c727d5d03532fac89a523aa3865856e73a8ebcd1677ab",
  "parentHash": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "nonce": "0x0000000000000000",
  "mixHash": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "receiptsRoot": "0x56e81f171bcc55a6ff8345e692c0f86e5b48e01b996cad001622fb5e363b421",
  "logsBloom": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "sha3Uncles": "0x1dcc4de8dec75d7aab85b567b6ccd41ad312451b948a7413f0a142fd40d49347",
  "extraData": "0x",
  "gasLimit": 8000000,
  "gasUsed": 0,
  "miner": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "size": 504,
  "stateRoot": "0xb2397b93f850af9c553f13bb188ad1e438df8f372474f67b59da9989cced7de",
  "timestamp": 0,
  "transactions": []
}
```

On vérifie sur on a bien créé un compte [0] avec la commande suivante via la console sur le client : eth accounts



```
> eth.accountsINFO [11-16|17:48:54.952] Looking for peers
peercount=1 tried=17 static=0
["0x6e530161a48ef494360d9f49cff6b641b516fc7b", "0x6c66e9335ba2fc92b74e482e4568eba04965cf62"]
```

Vérifions que le 2e block créé est le même grâce à la commande eth.getBlock(1) :



```
> miner.start(1)
INFO [11-16|17:49:45.075] Updated mining threads                      threads=1
INFO [11-16|17:49:45.075] Transaction pool price threshold updated price=1,000,000,000
null
> INFO [11-16|17:49:45.076] Commit new sealing work                      number=53
sealhash=bc01a4..089238 uncles=0 txs=0 gas=0 fees=0 elapsed="303.86µs"
INFO [11-16|17:49:45.077] Commit new sealing work                      number=53 sealhash=bc01a4..089238 uncles=0 txs=0 gas=0 fees=0 elapsed="762.799µs"
INFO [11-16|17:49:45.560] Looking for peers                          peercount=1
tried=181 static=0
WARN [11-16|17:49:52.073] Disk space is running low. Geth will shutdown if disk space runs below critical level. available=567.46MiB critical_level=488.00MiB
INFO [11-16|17:49:58.503] Generating DAG in progress                  epoch=0 percentage=0 elapsed=10.983s
INFO [11-16|17:50:05.982] Looking for peers                          peercount=1
tried=48 static=0
INFO [11-16|17:50:09.805] Generating DAG in progress                  epoch=0 percentage=1 elapsed=22.285s
INFO [11-16|17:50:15.985] Looking for peers                          peercount=1
tried=103 static=0
INFO [11-16|17:50:21.622] Generating DAG in progress                  epoch=0 percentage=2 elapsed=34.102s
WARN [11-16|17:50:22.086] Disk space is running low. Geth will shutdown if disk space runs below critical level. available=567.44MiB critical_level=488.00MiB
INFO [11-16|17:50:26.924] Looking for peers                          peercount=1
tried=98 static=0
```

```
Activities Terminal mer. 17:51
antheanea@antheanea-VirtualBox: ~/private-ethereum2
File Edit View Search Terminal Help
WARN [11-16|17:50:22.086] Disk space is running low. Geth will shutdown if disk space runs below critical level. available=567.44MiB critical_level=488.00MiB
INFO [11-16|17:50:26.924] Looking for peers                          peercount=1
tried=98 static=0
INFO [11-16|17:50:33.490] Generating DAG in progress                  epoch=0 percentage=3 elapsed=45.970s
INFO [11-16|17:50:37.446] Looking for peers                          peercount=1
tried=110 static=0
INFO [11-16|17:50:44.913] Generating DAG in progress                  epoch=0 percentage=5 elapsed=57.393s
INFO [11-16|17:50:47.718] Looking for peers                          peercount=1
tried=106 static=0
WARN [11-16|17:50:52.092] Disk space is running low. Geth will shutdown if disk space runs below critical level. available=567.42MiB critical_level=488.00MiB
INFO [11-16|17:50:57.217] Generating DAG in progress                  epoch=0 percentage=5 elapsed=1m9.697s
INFO [11-16|17:50:57.836] Looking for peers                          peercount=2
tried=137 static=0
INFO [11-16|17:51:07.950] Looking for peers                          peercount=1
tried=94 static=0
INFO [11-16|17:51:10.523] Generating DAG in progress                  epoch=0 percentage=6 elapsed=1m23.003s
INFO [11-16|17:51:17.980] Looking for peers                          peercount=2
tried=52 static=0
WARN [11-16|17:51:22.102] Disk space is running low. Geth will shutdown if disk space runs below critical level. available=567.39MiB critical_level=488.00MiB
INFO [11-16|17:51:22.389] Generating DAG in progress                  epoch=0 percentage=7 elapsed=1m34.868s
INFO [11-16|17:51:28.101] Looking for peers                          peercount=1
```



On voit que le block est bien créé , il correspond à celui du serveur, nous sommes donc bien synchronisés.