

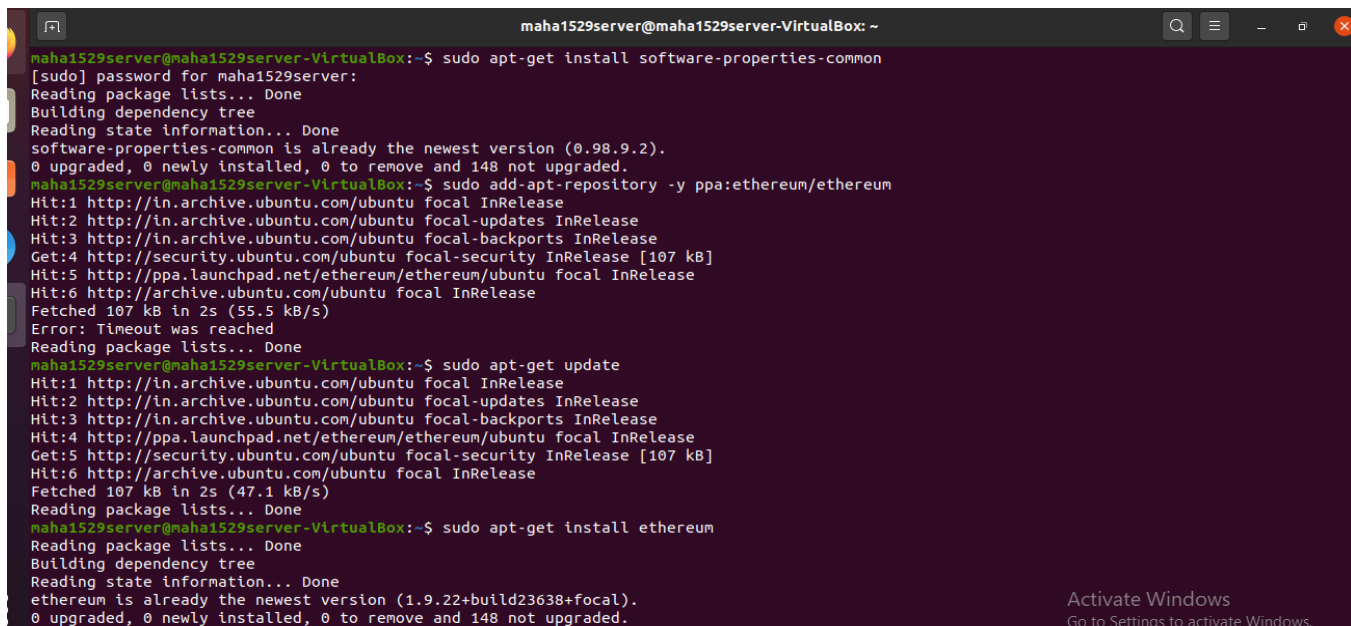
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SECTION J

DESIGN AN ETHEREUM PRIVATE BLOCKCHAIN

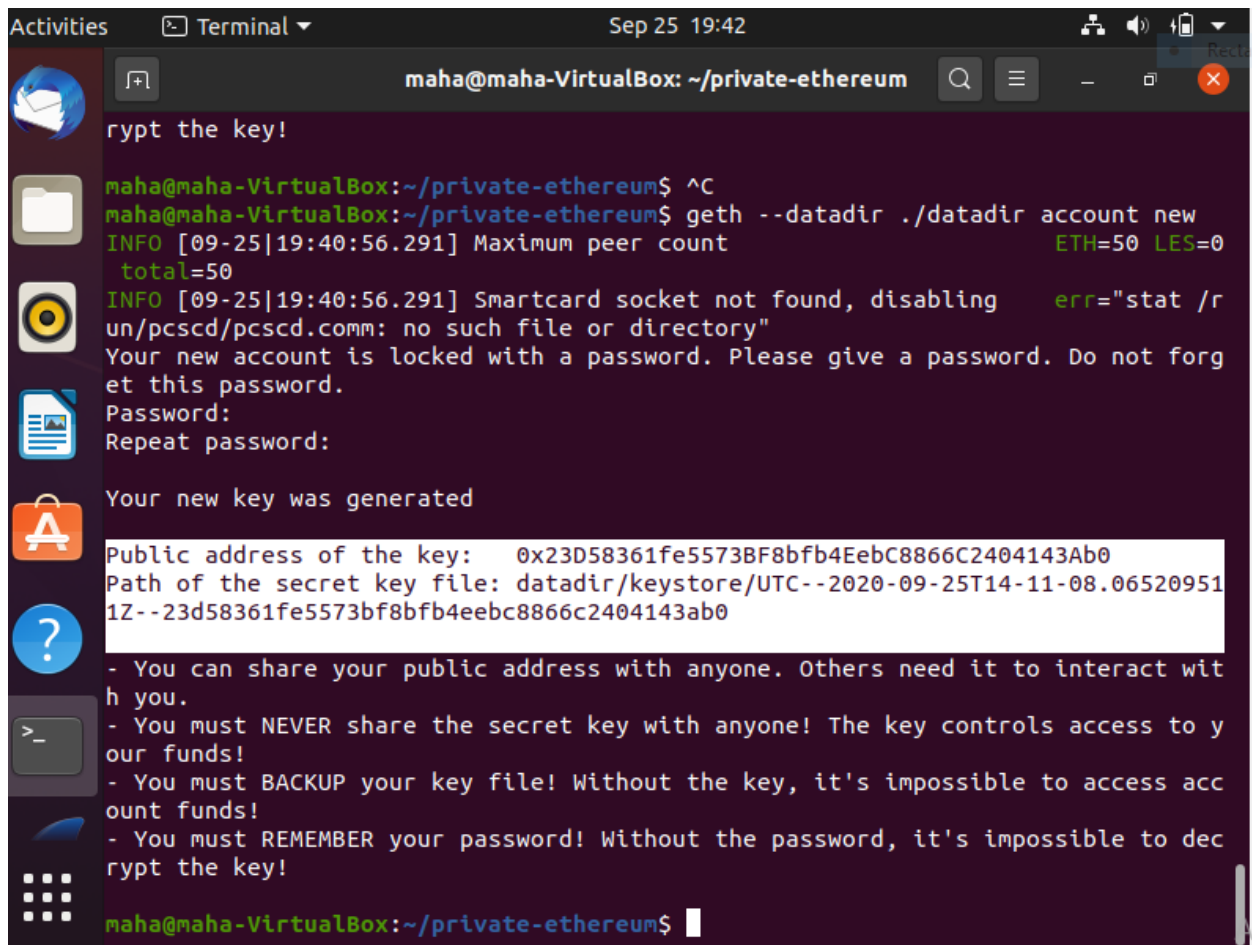
1) ENVIROMENTAL SETUP



```
maha1529server@maha1529server-VirtualBox: ~  
maha1529server@maha1529server-VirtualBox:~$ sudo apt-get install software-properties-common  
[sudo] password for maha1529server:  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
software-properties-common is already the newest version (0.98.9.2).  
0 upgraded, 0 newly installed, 0 to remove and 148 not upgraded.  
maha1529server@maha1529server-VirtualBox:~$ sudo add-apt-repository -y ppa:ethereum/ethereum  
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease  
Hit:2 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease  
Hit:3 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease  
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [107 kB]  
Hit:5 http://ppa.launchpad.net/ethereum/ethereum/ubuntu focal InRelease  
Hit:6 http://archive.ubuntu.com/ubuntu focal InRelease  
Fetched 107 kB in 2s (55.5 kB/s)  
Error: Timeout was reached  
Reading package lists... Done  
maha1529server@maha1529server-VirtualBox:~$ sudo apt-get update  
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease  
Hit:2 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease  
Hit:3 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease  
Hit:4 http://ppa.launchpad.net/ethereum/ethereum/ubuntu focal InRelease  
Get:5 http://security.ubuntu.com/ubuntu focal-security InRelease [107 kB]  
Hit:6 http://archive.ubuntu.com/ubuntu focal InRelease  
Fetched 107 kB in 2s (47.1 kB/s)  
Reading package lists... Done  
maha1529server@maha1529server-VirtualBox:~$ sudo apt-get install ethereum  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
ethereum is already the newest version (1.9.22+build23638+focal).  
0 upgraded, 0 newly installed, 0 to remove and 148 not upgraded.
```

All packages successfully installed .

2) CREATING 2 ACCOUNTS UNDER “private-etheruem “ DIRECTORY



The screenshot shows a terminal window titled "maha@maha-VirtualBox: ~/private-ethereum". The user has entered the command `geth --datadir ./datadir account new`. The terminal output shows the account creation process, including a warning about the smartcard socket and a prompt for a password. The public address and path of the secret key file are displayed. A list of instructions follows, emphasizing the importance of keeping the key and password secure.

```
maha@maha-VirtualBox: ~/private-ethereum$ ^C
maha@maha-VirtualBox: ~/private-ethereum$ geth --datadir ./datadir account new
INFO [09-25|19:40:56.291] Maximum peer count          ETH=50 LES=0
total=50
INFO [09-25|19:40:56.291] 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: 0x23D58361fe5573BF8bf4EebC8866C2404143Ab0
Path of the secret key file: datadir/keystore/UTC--2020-09-25T14-11-08.065209511Z--23d58361fe5573bf8bf4eebc8866c2404143ab0

- 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!

maha@maha-VirtualBox: ~/private-ethereum$
```

3) CREATING GENESIS FILE

Genesis was created exactly as mentioned . difficulty was set to 5 and the addresses were changed to my respective addresses . Etherbase was also initiated.

```
maha1529server@maha1529server-VirtualBox: ~/private-ethereum
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!

maha1529server@maha1529server-VirtualBox:~/private-ethereum$ ^C
maha1529server@maha1529server-VirtualBox:~/private-ethereum$ gedit genesis.json
maha1529server@maha1529server-VirtualBox:~/private-ethereum$ geth --datadir ./datadir init genesis.json
NFO [10-01|14:28:38.976] Maximum peer count ETH=50 LES=0 total=50
NFO [10-01|14:28:38.992] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no suc
file or directory"
NFO [10-01|14:28:39.008] Set global gas cap cap=25000000
NFO [10-01|14:28:39.011] Allocated cache and file handles database=/home/maha1529server/private-e
thereum/datadir/ethash/chaindata cache=16.00MiB handles=16
NFO [10-01|14:28:39.039] Writing custom genesis block
NFO [10-01|14:28:39.082] Persisted trie from memory database nodes=3 size=411.00B time="106.72µs" gc
odes=0 gcsiz=0.00B gctime=0s livenodes=1 livesize=0.00B
NFO [10-01|14:28:39.087] Successfully wrote genesis state database=chaindata hash="a7c069...01fa8c"
NFO [10-01|14:28:39.089] Allocated cache and file handles database=/home/maha1529server/private-e
thereum/datadir/ethash/lightchaindata cache=16.00MiB handles=16
NFO [10-01|14:28:39.097] Writing custom genesis block
NFO [10-01|14:28:39.098] Persisted trie from memory database nodes=3 size=411.00B time="69.284µs" gc
odes=0 gcsiz=0.00B gctime=0s livenodes=1 livesize=0.00B
NFO [10-01|14:28:39.098] Successfully wrote genesis state database=lightchaindata hash="a7c069...01
fa8c"
maha1529server@maha1529server-VirtualBox:~/private-ethereum$
```

Genesis file was initially edited on gedit but later on I did confirm with nano , content was intact.

4) ADDING TO NETWORK

Launching geth console

```
maha1529server@maha1529server-VirtualBox: ~/private-ethereum
NFO [10-01|14:29:36.223] Initialized fast sync bloom items=3 errorrate=0.000 elapsed=6.176ms
NFO [10-01|14:29:36.282] Starting peer-to-peer node instance=Geth/v1.9.22-stable-c71a7e26/l
inux-amd64/go1.15
NFO [10-01|14:29:36.426] New local node record seq=1 id=166ac5529c78c943 ip=127.0.0.1
dp=30303 tcp=30303
NFO [10-01|14:29:36.443] IPC endpoint opened url=/home/maha1529server/private-ethere
um/datadir/ethash.ipc
NFO [10-01|14:29:36.479] Started P2P networking self=enode://86241ebf2fd9b68f170f4f9971
972eefccd4348d38600bed89cbcd584dbea59d618e1c07afb5961565cee693f7fa276f2a60032d19fe6f8909110bbfda08aba@127
0.0.1:30303
NFO [10-01|14:29:36.660] Ethereum automatically configured address=0xE363751c8760d1493506DB00Df91B
8294370ea4
Welcome to the Geth JavaScript console!

instance: Geth/v1.9.22-stable-c71a7e26/linux-amd64/go1.15
coinbase: 0xe363751c8760d1493506db00df91bc8294370ea4
current block: 0 (Thu Jan 01 1970 05:30:00 GMT+0530 (IST))
datadir: /home/maha1529server/private-ethereum/datadir
modules: admin:1.0 debug:1.0 eth:1.0 ethash:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 txpool:1.0 web3:1.

INFO [10-01|14:29:40.198] New local node record seq=2 id=166ac5529c78c943 ip=122.172.
6.36 udp=63616 tcp=30303
```

Using eth libraries :

```

> eth.accounts
["0xe363751c8760d1493506db00df91bc8294370ea4", "0x7cb1728ddb2d4a0e963e77b8e3aac17bdf262d13"]
> INFO [10-01|14:30:36.862] Looking for peers                peercount=0 tried=61 static=0
> eth.getBalance(eth.accounts[0])
0
> INFO [10-01|14:30:46.950] Looking for peers                peercount=1 tried=60 static=0
> eth.blockNumberINFO [10-01|14:30:57.057] Looking for peers                peercount=1 tried=57
tatic=0
> eth.blockNumber
0
> INFO [10-01|14:31:07.074] Looking for peers                peercount=0 tried=41 static=0

```

5) MINING

```

maha1529server@maha1529server-VirtualBox: ~/private-ethereum
INFO [10-01|14:33:00.213] Updated mining threads                threads=1
INFO [10-01|14:33:00.258] Transaction pool price threshold updated price=10000000000
null
- INFO [10-01|14:33:00.298] Commit new mining work                number=1 sealhash="921dad...65711e" unc
es=0 txs=0 gas=0 fees=0 elapsed="248.92µs"
- miner.start(1)
INFO [10-01|14:33:02.992] Updated mining threads                threads=1
null
- INFO [10-01|14:33:03.518] Generating DAG in progress                epoch=0 percentage=11 elapsed=1m10.32
s
INFO [10-01|14:33:09.080] Generating DAG in progress                epoch=0 percentage=12 elapsed=1m15.888s
INFO [10-01|14:33:09.800] Looking for peers                peercount=0 tried=69 static=0
INFO [10-01|14:33:14.628] Generating DAG in progress                epoch=0 percentage=13 elapsed=1m21.436s
INFO [10-01|14:33:19.865] Looking for peers                peercount=0 tried=55 static=0
INFO [10-01|14:33:20.453] Generating DAG in progress                epoch=0 percentage=14 elapsed=1m27.261s
INFO [10-01|14:33:25.898] Generating DAG in progress                epoch=0 percentage=15 elapsed=1m32.706s
INFO [10-01|14:33:29.899] Looking for peers                peercount=0 tried=48 static=0
INFO [10-01|14:33:31.482] Generating DAG in progress                epoch=0 percentage=16 elapsed=1m38.290s
INFO [10-01|14:33:37.161] Generating DAG in progress                epoch=0 percentage=17 elapsed=1m43.969s
INFO [10-01|14:33:39.934] Looking for peers                peercount=0 tried=53 static=0
INFO [10-01|14:33:42.413] Generating DAG in progress                epoch=0 percentage=18 elapsed=1m49.221s
INFO [10-01|14:33:47.888] Generating DAG in progress                epoch=0 percentage=19 elapsed=1m54.696s
INFO [10-01|14:33:50.138] Looking for peers                peercount=0 tried=56 static=0

maha1529server@maha1529server-VirtualBox: ~/private-ethereum
INFO [10-01|14:40:27.730] Generating DAG in progress                epoch=0 percentage=90 elapsed=8m34.538s
INFO [10-01|14:40:34.261] Looking for peers                peercount=0 tried=103 static=0
INFO [10-01|14:40:35.629] Generating DAG in progress                epoch=0 percentage=91 elapsed=8m42.437s
INFO [10-01|14:40:42.103] Generating DAG in progress                epoch=0 percentage=92 elapsed=8m48.911s
INFO [10-01|14:40:44.275] Looking for peers                peercount=0 tried=94 static=0
INFO [10-01|14:40:48.161] Generating DAG in progress                epoch=0 percentage=93 elapsed=8m54.969s
INFO [10-01|14:40:53.984] Generating DAG in progress                epoch=0 percentage=94 elapsed=9m0.792s
INFO [10-01|14:40:54.510] Looking for peers                peercount=0 tried=79 static=0
INFO [10-01|14:41:00.350] Generating DAG in progress                epoch=0 percentage=95 elapsed=9m7.158s
INFO [10-01|14:41:04.514] Looking for peers                peercount=0 tried=97 static=0
INFO [10-01|14:41:07.488] Generating DAG in progress                epoch=0 percentage=96 elapsed=9m14.296s
INFO [10-01|14:41:14.668] Looking for peers                peercount=0 tried=91 static=0
INFO [10-01|14:41:17.498] Generating DAG in progress                epoch=0 percentage=97 elapsed=9m24.306s
INFO [10-01|14:41:23.964] Generating DAG in progress                epoch=0 percentage=98 elapsed=9m30.772s
INFO [10-01|14:41:24.677] Looking for peers                peercount=1 tried=109 static=0
INFO [10-01|14:41:30.653] Generating DAG in progress                epoch=0 percentage=99 elapsed=9m37.461s
INFO [10-01|14:41:30.697] Generated ethash verification cache    epoch=0 elapsed=9m37.469s
INFO [10-01|14:41:35.698] Looking for peers                peercount=0 tried=78 static=0
INFO [10-01|14:41:37.778] Generating ethash verification cache    epoch=1 percentage=2 elapsed=3.207s
INFO [10-01|14:41:42.736] Generating ethash verification cache    epoch=1 percentage=10 elapsed=8.165s
INFO [10-01|14:41:45.756] Generating ethash verification cache    epoch=1 percentage=14 elapsed=11.185s
INFO [10-01|14:41:45.757] Looking for peers                peercount=0 tried=33 static=0
INFO [10-01|14:41:49.582] Generating ethash verification cache    epoch=1 percentage=15 elapsed=15.011s

```