

Project 2

By: Shayan and Ryea

1. Run binary geth

```
crypto@crypto: ~/Project2
File Edit Tabs Help
crypto@crypto:~$ cd Project2/
crypto@crypto:~/Project2$ ls
geth  geth-linux-amd64-1.9.15-0f77f34b.tar.gz
crypto@crypto:~/Project2$ ./geth
INFO [05-03|19:39:09.090] Starting Geth on Ethereum mainnet...
INFO [05-03|19:39:09.090] Bumping default cache on mainnet           provided=1024
updated=4096
WARN [05-03|19:39:09.090] Sanitizing cache to Go's GC limits         provided=4096
updated=2587
INFO [05-03|19:39:09.091] Maximum peer count                         ETH=50 LES=0
total=50
INFO [05-03|19:39:09.091] Smartcard socket not found, disabling     err="stat /ru
n/pcscd/pcscd.comm: no such file or directory"
INFO [05-03|19:39:09.092] Starting peer-to-peer node               instance=Geth
/v1.9.15-stable-0f77f34b/linux-amd64/go1.14.4
INFO [05-03|19:39:09.092] Allocated trie memory caches              clean=388.00M
iB dirty=646.00MiB
INFO [05-03|19:39:09.092] Allocated cache and file handles          database=/hom
e/crypto/.ethereum/geth/chaindata cache=1.26GiB handles=524288
INFO [05-03|19:39:09.141] Opened ancient database                  database=/hom
e/crypto/.ethereum/geth/chaindata/ancient
INFO [05-03|19:39:09.142] Initialised chain configuration           config="{Chai
nID: 1 Homestead: 1150000 DAO: 1920000 DAOSupport: true EIP150: 2463000 EIP155:
2675000 EIP158: 2675000 Byzantium: 4370000 Constantinople: 7280000 Petersburg: 7
```

3.1

- Create a genesis.json file describing the private Ethereum network

```
crypto@crypto: ~/Project2
File Edit Tabs Help
GNU nano 2.9.3 genesis.json

{
  "config": {
    "chainId": 12345,
    "homesteadBlock": 0,
    "eip150Block": 0,
    "eip155Block": 0,
    "eip158Block": 0
  },
  "nonce": "0x0",
  "timestamp": "0x0",
  "parentHash": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "extraData": "0x00",
  "gasLimit": "0x8000000",
  "difficulty": "0x1",
  "mixHash": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "coinbase": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "alloc": {}
}

[ Read 18 lines ]
^G Get Help      ^O Write Out    ^W Where Is     ^K Cut Text     ^J Justify      ^C Cur Pos
^X Exit          ^R Read File    ^\ Replace      ^U Uncut Text   ^T To Spell     ^_ Go To Line
```

- Use the pre-compiled geth binary to init the private Ethereum network

```
crypto@crypto: ~/Project2
File Edit Tabs Help
crypto@crypto:~/Project2$ nano genesis.json
crypto@crypto:~/Project2$ ./geth --datadir ./ethdata init ./genesis.json
Fatal: invalid genesis file: invalid character '"' after object key:value pair
crypto@crypto:~/Project2$ nano genesis.json
crypto@crypto:~/Project2$ ./geth --datadir ./ethdata init ./genesis.json
INFO [05-03|20:12:56.231] Maximum peer count                      ETH=50 LES=0
total=50
INFO [05-03|20:12:56.231] Smartcard socket not found, disabling    err="stat /ru
n/pcscd/pcscd.comm: no such file or directory"
INFO [05-03|20:12:56.232] Allocated cache and file handles         database=/hom
e/crypto/Project2/ethdata/geth/chaindata cache=16.00MiB handles=16
INFO [05-03|20:12:56.235] Writing custom genesis block
INFO [05-03|20:12:56.235] Persisted trie from memory database       nodes=0 size=
0.00B time="1.5µs" gcnodes=0 gcsiz=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [05-03|20:12:56.236] Successfully wrote genesis state          database=chai
ndata hash="a76bf9...b89b39"
INFO [05-03|20:12:56.236] Allocated cache and file handles         database=/hom
e/crypto/Project2/ethdata/geth/lightchaindata cache=16.00MiB handles=16
INFO [05-03|20:12:56.238] Writing custom genesis block
INFO [05-03|20:12:56.238] Persisted trie from memory database       nodes=0 size=
0.00B time="1.208µs" gcnodes=0 gcsiz=0.00B gctime=0s livenodes=1 livesize=0.00B
INFO [05-03|20:12:56.238] Successfully wrote genesis state          database=ligh
tchaindata hash="a76bf9...b89b39"
crypto@crypto:~/Project2$
```

- Run your private Ethereum network and enable the geth console

```
crypto@crypto:~/Project2$ ./geth --datadir ./ethdata --networkid 12345 --nodiscover console
INFO [05-03|20:15:30.789] Maximum peer count           ETH=50 LES=0 total=50
INFO [05-03|20:15:30.789] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.co
mm: no such file or directory"
INFO [05-03|20:15:30.791] Starting peer-to-peer node     instance=Geth/v1.9.15-stable-
0f77f34b/linux-amd64/go1.14.4
INFO [05-03|20:15:30.791] Allocated trie memory caches   clean=256.00MiB dirty=256.00M
iB
INFO [05-03|20:15:30.791] Allocated cache and file handles database=/home/crypto/Project
2/ethdata/geth/chaindata cache=512.00MiB handles=524288
INFO [05-03|20:15:30.816] Opened ancient database        database=/home/crypto/Project
2/ethdata/geth/chaindata/ancient
INFO [05-03|20:15:30.816] Initialised chain configuration config="{ChainID: 12345 Homes
tead: 0 DAO: <nil> DAOsupport: false EIP150: 0 EIP155: 0 EIP158: 0 Byzantium: <nil> Constantinop
le: <nil> Petersburg: <nil> Istanbul: <nil>, Muir Glacier: <nil>, YOLO v1: <nil>, Engine: unknow
n}"
INFO [05-03|20:15:30.816] Disk storage enabled for ethash caches dir=/home/crypto/Project2/eth
data/geth/ethash count=3
INFO [05-03|20:15:30.816] Disk storage enabled for ethash DAGs dir=/home/crypto/.ethash coun
t=2
INFO [05-03|20:15:30.816] Initialising Ethereum protocol versions="[65 64 63]" network
=12345 dbversion=<nil>
WARN [05-03|20:15:30.816] Upgrade blockchain database version from=<nil> to=7
INFO [05-03|20:15:30.816] Loaded most recent local header number=0 hash="a76bf9...b89b39"
```

- Play supported commands

```
Welcome to the Geth JavaScript console!

instance: Geth/v1.9.15-stable-0f77f34b/linux-amd64/go1.14.4
at block: 0 (Thu Jan 01 1970 10:00:00 GMT+1000 (AEST))
datadir: /home/crypto/Project2/ethdata
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 web3:1.0

> eth.blockNumber
0
> exit
INFO [05-03|20:18:09.357] IPC endpoint closed           url=/home/crypto/Project2/eth
data/geth.ipc
INFO [05-03|20:18:09.357] Ethereum protocol stopped
INFO [05-03|20:18:09.357] Transaction pool stopped
INFO [05-03|20:18:09.357] Blockchain stopped
crypto@crypto:~/Project2$
```

4.1 Task Description

- Create at least two accounts

Account 1: 0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7

Account 2: 0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31

```

crypto@crypto:~/Project2$ ./geth --datadir ./ethdata account new
INFO [05-03|20:36:34.358] Maximum peer count          ETH=50 LES=0 total=50
INFO [05-03|20:36:34.358] Smartcard socket not found, disabling  err="stat /run/pcscd/pcscd.co
mm: 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: 0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7
Path of the secret key file: ethdata/keystore/UTC--2025-05-03T10-37-00.983884312Z--f58b6a1d14afd
9032897f6162ab02a86303eabf7

- 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!

crypto@crypto:~/Project2$ █

crypto@crypto:~/Project2$ ./geth --datadir ./ethdata account new
INFO [05-03|20:38:15.517] Maximum peer count          ETH=50 LES=0 total=50
INFO [05-03|20:38:15.517] Smartcard socket not found, disabling  err="stat /run/pcscd/pcscd.co
mm: 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: 0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31
Path of the secret key file: ethdata/keystore/UTC--2025-05-03T10-38-24.226680628Z--10a3f5d46e90b
c37ce302b8e9566226e4ee76c31

- 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!

```

- **Set one account to be the etherbase to receive token reward from mining**

Account 1 is set as receiver

```
crypto@crypto: ~/Project2
File Edit Tabs Help
crypto@crypto:~$ cd Project2/
crypto@crypto:~/Project2$ ./geth --datadir ./ethdata --networkid 12345 --nodiscover console
INFO [05-03|21:18:35.536] Maximum peer count                      ETH=50 LES=0
total=50
INFO [05-03|21:18:35.536] Smartcard socket not found, disabling  err="stat /run/pcscd/pcscd.comm: no such file or directory"
INFO [05-03|21:18:35.537] Starting peer-to-peer node              instance=Geth/v1.9.15-stable-0f77f34b/linux-amd64/go1.14.4
INFO [05-03|21:18:35.537] Allocated trie memory caches           clean=256.00MiB
dirty=256.00MiB
INFO [05-03|21:18:35.537] Allocated cache and file handles       database=/home/crypto/Project2/ethdata/geth/chaindata cache=512.00MiB handles=524288
INFO [05-03|21:18:35.553] Opened ancient database                database=/home/crypto/Project2/ethdata/geth/chaindata/ancient
INFO [05-03|21:18:35.553] Initialised chain configuration        config="{ChainID: 12345 Homestead: 0 DAO: <nil> DAOSupport: false EIP150: 0 EIP155: 0 EIP158: 0 Byzantium: <nil> Constantinople: <nil> Petersburg: <nil> Istanbul: <nil>, Muir Glacier: <nil>, YOLO v1: <nil>, Engine: unknown}"
INFO [05-03|21:18:35.553] Disk storage enabled for ethash caches dir=/home/crypto/Project2/ethdata/geth/ethash count=3
INFO [05-03|21:18:35.553] Disk storage enabled for ethash DAGs   dir=/home/crypto/.ethash count=2
INFO [05-03|21:18:35.553] Initialising Ethereum protocol         versions="[65
Welcome to the Geth JavaScript console!

instance: Geth/v1.9.15-stable-0f77f34b/linux-amd64/go1.14.4
coinbase: 0xf58b6ald14afd9032897f6162ab02a86303eabf7
at block: 88 (Sat May 03 2025 21:09:51 GMT+1000 (AEST))
  datadir: /home/crypto/Project2/ethdata
  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 web3:1.0

> eth.accounts
["0xf58b6ald14afd9032897f6162ab02a86303eabf7", "0x10a3f5d46e90bc37ce302b8e9566226e4ee76c31"]
> miner.setEtherbase(eth.accounts[0])
true
```

• Mining for tokens

Welcome to the Geth JavaScript console!

```
instance: Geth/v1.9.15-stable-0f77f34b/linux-amd64/go1.14.4
coinbase: 0xf58b6a1d14afd9032897f6162ab02a86303eabf7
at block: 88 (Sat May 03 2025 21:09:51 GMT+1000 (AEST))
  datadir: /home/crypto/Project2/ethdata
  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 web3:1.0
```

```
> eth.accounts
["0xf58b6a1d14afd9032897f6162ab02a86303eabf7", "0x10a3f5d46e90bc37ce302b8e9566226e4ee76c31"]
> miner.setEtherbase(eth.accounts[0])
```

true

```
> miner.start()
```

```
INFO [05-03|21:27:43.028] Updated mining threads                      threads=2
```

```
INFO [05-03|21:27:43.028] Transaction pool price threshold updated price=1000000000
```

null

```
> INFO [05-03|21:27:43.028] Commit new mining work                      number=89 s
```

```
alhash="0b229c...2c886d" uncles=0 txs=0 gas=0 fees=0 elapsed="68.869µs"
```

```
INFO [05-03|21:27:43.493] Successfully sealed new block                      number=89 sea
```

```
lhash="0b229c...2c886d" hash="60f575...3b54da" elapsed=464.998ms
```

```
INFO [05-03|21:27:43.493] mined potential block                      number=89 h
```

```
alhash="e9cc76...0d833f" hash="31431c...71daab" elapsed=42.582ms
```

```
INFO [05-03|21:28:39.865] ⚡ block reached canonical chain                      number=131 h
```

```
ash="7fc2d6...db1c88"
```

```
INFO [05-03|21:28:39.894] Commit new mining work                      number=139 se
```

```
alhash="beaab8...1059c3" uncles=0 txs=0 gas=0 fees=0 elapsed=28.485ms
```

```
INFO [05-03|21:28:39.894] ⚡ mined potential block                      number=138 h
```

```
ash="31431c...71daab"
```

```
INFO [05-03|21:28:43.766] Successfully sealed new block                      number=139 se
```

```
alhash="beaab8...1059c3" hash="96ae4d...b9401a" elapsed=3.900s
```

```
INFO [05-03|21:28:43.766] ⚡ block reached canonical chain                      number=132 h
```

```
ash="f24488...5aeb70"
```

```
INFO [05-03|21:28:43.766] ⚡ mined potential block                      number=139 h
```

```
ash="96ae4d...b9401a"
```

```
INFO [05-03|21:28:43.766] Commit new mining work                      number=140 se
```

```
alhash="8a0078...62aa4e" uncles=0 txs=0 gas=0 fees=0 elapsed="124.866µs"
```

```
INFO [05-03|21:28:45.007] Successfully sealed new block                      number=140 se
```

```
alhash="8a0078...62aa4e" hash="3f1178...ac7a4a" elapsed=1.240s
```

```
INFO [05-03|21:28:45.007] ⚡ block reached canonical chain                      number=133 h
```

```
ash="5faac0...0cebfd"
```

```
INFO [05-03|21:28:45.007] ⚡ mined potential block                      number=140 h
```

```
ash="3f1178...ac7a4a"
```

```
INFO [05-03|21:28:45.007] Commit new mining work                      number=141 se
```

```
alhash="7fe0e7...8c0b7c" uncles=0 txs=0 gas=0 fees=0 elapsed="69.827µs"
```

- **Check the balance of the account**

```
Welcome to the Geth JavaScript console!

instance: Geth/v1.9.15-stable-0f77f34b/linux-amd64/go1.14.4
coinbase: 0xf58b6a1d14afd9032897f6162ab02a86303eabf7
at block: 652 (Sat May 03 2025 21:39:05 GMT+1000 (AEST))
  datadir: /home/crypto/Project2/ethdata
  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 web3:1.0

> eth.coinbase
"0xf58b6a1d14afd9032897f6162ab02a86303eabf7"
> eth.coinbase
"0xf58b6a1d14afd9032897f6162ab02a86303eabf7"
> eth.blockNumber
652
> eth.getBalance(eth.coinbase)
3.26e+21
> web3.fromWei(eth.getBalance(eth.coinbase), "ether")
3260
>
```

5.1

- **Stop mining and check the balance of the two accounts**

```
Welcome to the Geth JavaScript console!

instance: Geth/v1.9.15-stable-0f77f34b/linux-amd64/go1.14.4
coinbase: 0xf58b6a1d14afd9032897f6162ab02a86303eabf7
at block: 673 (Sat May 03 2025 21:44:05 GMT+1000 (AEST))
  datadir: /home/crypto/Project2/ethdata
  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 web3:1.0

> miner.stop()
null
> eth.getBalance("0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7")
3.365e+21
> eth.getBalance("0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31")
0
>
```


- Create a transaction from the ether base account to another account

eth.sendTransaction({from: "0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7", to: "0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31", value: web3.toWei(1, "ether")})

```
> miner.stop()
null
> eth.getBalance("0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7")
3.365e+21
> eth.getBalance("0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31")
0
> personal.unlockAccount("0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7")
Unlock account 0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7
Passphrase:
true
> eth.sendTransaction({from: "0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7", to: "
0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31", value: web3.toWei(1, "ether")})
INFO [05-03|21:51:34.562] Setting new local account          address=0xf58
B6A1d14aFd9032897F6162Ab02A86303eaBF7
INFO [05-03|21:51:34.562] Submitted transaction          fullhash=0x2e
86a3e476ca7b91de460c5ff2155b07e148737746222d3ab6527270afbab855 recipient=0x10A3f
5d46E90bc37cE302b8E9566226E4ee76C31
"0x2e86a3e476ca7b91de460c5ff2155b07e148737746222d3ab6527270afbab855"
> shayan and ryea
```

- Send the transaction

```
> miner.stop()
null
> eth.getBalance("0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7")
3.365e+21
> eth.getBalance("0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31")
0
> personal.unlockAccount("0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7")
Unlock account 0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7
Passphrase:
true
> eth.sendTransaction({from: "0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7", to: "
0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31", value: web3.toWei(1, "ether")})
INFO [05-03|21:51:34.562] Setting new local account          address=0xf58
B6A1d14aFd9032897F6162Ab02A86303eaBF7
INFO [05-03|21:51:34.562] Submitted transaction          fullhash=0x2e
86a3e476ca7b91de460c5ff2155b07e148737746222d3ab6527270afbab855 recipient=0x10A3f
5d46E90bc37cE302b8E9566226E4ee76C31
"0x2e86a3e476ca7b91de460c5ff2155b07e148737746222d3ab6527270afbab855"
> shayan and ryea
```


• Check the transaction pool

```
> txpool.status
{
  pending: 1,
  queued: 0
}
> txpool.content
{
  pending: {
    0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7: {
      0: {
        blockHash: null,
        blockNumber: null,
        from: "0xf58b6a1d14afd9032897f6162ab02a86303eabf7",
        gas: "0x5208",
        gasPrice: "0x3b9aca00",
        hash: "0x2e86a3e476ca7b91de460c5ff2155b07e148737746222d3ab6527270afbab855",
        input: "0x",
        nonce: "0x0",
        r: "0x155bc8041e13ae1727a74d055f4d1cfdad984c6865702a63f36c1fe1d14d5c81",
        s: "0x47634242334f273dd28fefc3f6c295fe16aa6f5c099db7982a6664d2ca8cc8c3",
        to: "0x10a3f5d46e90bc37ce302b8e9566226e4ee76c31",
        transactionIndex: null,
        v: "0x6096",
        value: "0xde0b6b3a7640000"
      }
    }
  },
}
```

• Start mining

```
> miner.start(1)
INFO [05-03|21:59:42.497] Updated mining threads          threads=1
INFO [05-03|21:59:42.497] Transaction pool price threshold updated price=1000000
000
null
> INFO [05-03|21:59:42.497] Commit new mining work          number=674
sealhash="f188af...b6afcc" uncles=0 txs=0 gas=0 fees=0 elapsed="68.917µs"
INFO [05-03|21:59:42.498] Commit new mining work          number=674 se
alhash="6728a5...a8a928" uncles=0 txs=1 gas=21000 fees=2.1e-05 elapsed="348.436µs"
INFO [05-03|21:59:44.678] Successfully sealed new block    number=674 se
alhash="6728a5...a8a928" hash="fd0eaa...cecf1e" elapsed=2.180s
INFO [05-03|21:59:44.678] ⚡ mined potential block        number=674 h
ash="fd0eaa...cecf1e"
INFO [05-03|21:59:44.678] Commit new mining work          number=675 se
alhash="ecf0a7...226a6f" uncles=0 txs=0 gas=0 fees=0 elapsed="74.469µs"
INFO [05-03|21:59:44.678] Commit new mining work          number=675 se
alhash="ecf0a7...226a6f" uncles=0 txs=0 gas=0 fees=0 elapsed="179.844µs"
INFO [05-03|21:59:46.198] Successfully sealed new block    number=675 se
alhash="ecf0a7...226a6f" hash="56de9d...3f6f19" elapsed=1.520s
```

- Check the balance of the two accounts

```
> web3.fromWei(eth.getBalance("0xf58B6A1d14aFd9032897F6162Ab02A86303eaBF7"), "ether")
3409
> web3.fromWei(eth.getBalance("0x10A3f5d46E90bc37cE302b8E9566226E4ee76C31"), "ether")
1
>
```

```
> eth.getTransaction("0x2e86a3e476ca7b91de460c5ff2155b07e148737746222d3ab6527270afbab855")
{
  blockHash: "0xfd0eaaf4534380282a9a38d0400459e559fb3099fa0006d3736014c04ccecfe",
  blockNumber: 674,
  from: "0xf58b6a1d14afd9032897f6162ab02a86303eabf7",
  gas: 21000,
  gasPrice: 1000000000,
  hash: "0x2e86a3e476ca7b91de460c5ff2155b07e148737746222d3ab6527270afbab855",
  input: "0x",
  nonce: 0,
  r: "0x155bc8041e13ae1727a74d055f4dlcfdad984c6865702a63f36c1feld14d5c81",
  s: "0x47634242334f273dd28fefc3f6c295fe16aa6f5c099db7982a6664d2ca8cc8c3",
  to: "0x10a3f5d46e90bc37ce302b8e9566226e4ee76c31",
  transactionIndex: 0,
  v: "0x6096",
  value: 1000000000000000000
}
> Shayan and Ryea
```