

## PRACTICAL: 4

### AIM:

Block.one: Creating a Multi Node EOSIO Blockchain

### THEORY:

EOSIO is a high-performance, open-source blockchain platform designed for building and deploying decentralized applications (dApps). It supports smart contracts and offers near-instant transaction processing with minimal fees. The EOSIO ecosystem relies on several key components like nodeos, cleos, and keosd to manage blockchain operations.

In a **single-node blockchain**, all operations—block production, validation, and transactions—are handled by a single instance of nodeos. While this setup is useful for development or testing, it doesn't reflect how real-world blockchains operate, which typically involve **multiple interconnected nodes** to ensure **redundancy, consensus, and fault tolerance**.

A **multi-node EOSIO blockchain** replicates the behavior of a decentralized network. Each node can serve a different role—such as a block producer, peer, or API endpoint—and they communicate through peer-to-peer (P2P) protocols.

### Key Components in EOSIO

- **nodeos**: The core daemon that runs an EOSIO node. It can produce blocks, validate transactions, and store blockchain data.
- **cleos**: A command-line tool used to interact with the blockchain. It allows developers to create accounts, deploy smart contracts, and transfer tokens.
- **keosd**: The wallet daemon that securely manages private keys needed for signing transactions.

### System Contracts

EOSIO uses **system smart contracts** to manage core functionalities such as:

- **eosio.bios**: Helps with initial blockchain bootstrapping.
- **eosio.token**: Manages token creation and transfers.
- **eosio.system**: Implements governance rules like voting and staking.

Deploying a multi-node blockchain is essential for understanding how decentralized networks function. It provides:

- **Redundancy**: If one node fails, others continue operating.
- **Scalability**: Load can be distributed across nodes.
- **Security**: Multiple nodes make the system harder to compromise.

- **Realistic Testing:** It simulates a real blockchain environment with inter-node communication.

## CODE:

- sudo apt update
- curl -LO [https://github.com/eosio/eos/releases/download/v2.1.0/eosio\\_2.1.0-1-ubuntu-20.04\\_amd64.deb](https://github.com/eosio/eos/releases/download/v2.1.0/eosio_2.1.0-1-ubuntu-20.04_amd64.deb)
- sudo apt install ./eosio\_2.1.0-1-ubuntu-20.04\_amd64.deb
- nodeos --version
- cleos version client
- keosd -v
- keosd --unlock-timeout 999999999 &
- cleos wallet create --file my\_wallet\_password
- cleos wallet list
- cleos wallet open
- cleos wallet unlock <my\_wallet\_password
- cleos wallet import --private-key  
5KQwrPbwdL6PhXujxW37FSSQZ1JiwsST4cqQzDeyXtP79zkvFD3
- sudo apt install build-essential
- curl -LO [https://github.com/eosio/eosio.cdt/releases/download/v1.8.1/eosio.cdt\\_1.8.1-1-ubuntu-18.04\\_amd64.deb](https://github.com/eosio/eosio.cdt/releases/download/v1.8.1/eosio.cdt_1.8.1-1-ubuntu-18.04_amd64.deb)
- sudo apt install ./eosio.cdt\_1.8.1-1-ubuntu-18.04\_amd64.deb
- eosio-cpp --version
- sudo apt install cmake
- git clone <https://github.com/EOSIO/eosio.contracts.git> \ --branch release/1.9.x --single-branch
- cd eosio.contracts
- ./build.sh -e /usr/opt/eosio/2.1.0 -c /usr/opt/eosio.cdt/1.8.1
- cd ~
- git clone https://github.com/EOSIO/eos.git \
- --branch release/2.1.x --single-branch
- cd eos/contracts/contracts/eosio.boot
- cmake .
- make
- cd ~
- mkdir nodes
- cat >nodes/genesis.json
- cat nodes/genesis.json
- mkdir nodes/00-boot
- tail -f nodes/00-boot/00.log
- cleos get account eosio
- cleos create account eosio eosio.bpay  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.msigs  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.names  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV

- cleos create account eosio eosio.ram  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.ramfee  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.saving  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.stake  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.token  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.vpay  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos create account eosio eosio.rex  
EOS6MRyAjQq8ud7hVNYcfnVPJqcVpscN5So8BhtHuGYqET5GDW5CV
- cleos set contract eosio.token ~/eosio.contracts/build/contracts/eosio.token/
- cleos set contract eosio.msg ~/eosio.contracts/build/contracts/eosio.msg/
- cleos push action eosio.token create ["eosio", "10000000000.0000 SYS"] -p eosio.token
- cleos push action eosio.token issue ["eosio", "10000000000.0000 SYS", "memo"] -p eosio
- sudo apt install jq
- curl -X POST http://127.0.0.1:8888/v1/producer/get\_supported\_protocol\_features -d  
'{"exclude\_disabled": false, "exclude\_unactivatable": false}' | jq | more
- curl -X POST http://127.0.0.1:8888/v1/producer/schedule\_protocol\_feature\_activations -d  
'{"protocol\_features\_to\_activate":  
["0ec7e080177b2c02b278d5088611686b49d739925a92d9bfcacd7fc6b74053bd"]}'
- cleos set contract eosio ~/eos/contracts/contracts/eosio.boot/
- # KV\_DATABASE
- cleos push action eosio activate  
["825ee6288fb1373eab1b5187ec2f04f6eacb39cb3a97f356a07c91622dd61d16"] -p eosio
- # ACTION\_RETURN\_VALUE
- cleos push action eosio activate  
["c3a6138c5061cf291310887c0b5c71fcaffcab90d5deb50d3b9e687cead45071"] -p eosio
- # CONFIGURABLE\_WASM\_LIMITS
- cleos push action eosio activate  
["bf61537fd21c61a60e542a5d66c3f6a78da0589336868307f94a82bccea84e88"] -p eosio
- # BLOCKCHAIN\_PARAMETERS
- cleos push action eosio activate  
["5443fcf88330c586bc0e5f3dee10e7f63c76c00249c87fe4fbf7f38c082006b4"] -p eosio
- # GET\_SENDER
- cleos push action eosio activate  
["f0af56d2c5a48d60a4a5b5c903edfb7db3a736a94ed589d0b797df33ff9d3e1d"] -p eosio
- # FORWARD\_SETCODE
- cleos push action eosio activate  
["2652f5f96006294109b3dd0bbde63693f55324af452b799ee137a81a905eed25"] -p eosio
- # ONLY\_BILL\_FIRST\_AUTHORIZER
- cleos push action eosio activate  
["8ba52fe7a3956c5cd3a656a3174b931d3bb2abb45578befc59f283ecd816a405"] -p eosio
- # RESTRICT\_ACTION\_TO\_SELF
- cleos push action eosio activate  
["ad9e3d8f650687709fd68f4b90b41f7d825a365b02c23a636cef88ac2ac00c43"] -p eosio

- # DISALLOW\_EMPTY\_PRODUCER\_SCHEDULE
- cleos push action eosio activate  
["68dcaa34c0517d19666e6b33add67351d8c5f69e999ca1e37931bc410a297428"] -p eosio
- # FIX\_LINKAUTH\_RESTRICTION
- cleos push action eosio activate  
["e0fb64b1085cc5538970158d05a009c24e276fb94e1a0bf6a528b48fbc4ff526"] -p eosio
- # REPLACE\_DEFERRED
- cleos push action eosio activate  
["ef43112c6543b88db2283a2e077278c315ae2c84719a8b25f25cc88565fba99"] -p eosio
- # NO\_DUPLICATE\_DEFERRED\_ID
- cleos push action eosio activate  
["4a90c00d55454dc5b059055ca213579c6ea856967712a56017487886a4d4cc0f"] -p eosio
- # ONLY\_LINK\_TO\_EXISTING\_PERMISSION
- cleos push action eosio activate  
["1a99a59d87e06e09ec5b028a9cbb7749b4a5ad8819004365d02dc4379a8b7241"] -p eosio
- # RAM\_RESTRICTIONS
- cleos push action eosio activate  
["4e7bf348da00a945489b2a681749eb56f5de00b900014e137ddae39f48f69d67"] -p eosio
- # WEBAUTHN\_KEY
- cleos push action eosio activate  
["4fca8bd82bbd181e714e283f83e1b45d95ca5af40fb89ad3977b653c448f78c2"] -p eosio
- # WTMSIG\_BLOCK\_SIGNATURES
- cleos push action eosio activate  
["299dcb6af692324b899b39f16d5a530a33062804e41f09dc97e9f156b4476707"] -p eosio
- cleos set contract eosio ~/eosio.contracts/build/contracts/eosio.system/
- cleos push action eosio setpriv ["eosio.msigs", 1] -p eosio
- cleos push action eosio init ["0", "4,SYS"] -p eosio
- cleos wallet import --private-key  
5KLGj1HGRWbk5xNmoKfrcrQHxvcVJBpdAckoiJgFftXSJjLPp7b
- cleos wallet import --private-key  
5K6qk1KaCYYWX86UhAfUsbMwhGPUqrqHrZEQDjs9ekP5j6LgHUu
- cleos wallet import --private-key  
5JCStvbRgUZ6hjyUiUaxt5iU3HP6zC1kwx3W7SweaEGvs4EPfQ
- cleos wallet import --private-key  
5JJjaKnAb9KM2vkkJDgrYXoeUEdGgWtB5WK1a38wrmKnS3KtkS6
- cleos system newaccount --transfer eosio producer.one  
EOS8imf2TDq6FKtLZ8mvXPWcd6EF2rQwo8zKdLNzsbU9EiMSt9Lwz --stake-net  
"50000000.0000 SYS" --stake-cpu "50000000.0000 SYS" --buy-ram-kbytes 8192
- cleos system newaccount --transfer eosio producer.two  
EOS7Ef4kuyTbXbtSPP5Bgethvo6pbitpuEz2RMWhXb8LXxEgcR7MC --stake-net  
"50000000.0000 SYS" --stake-cpu "50000000.0000 SYS" --buy-ram-kbytes 8192
- cleos system newaccount --transfer eosio producer.three  
EOS5n442Qz4yVc4LbdPCDnxNSseAiUCrNjRxAfPhUvM8tWS5svid6 --stake-net  
"50000000.0000 SYS" --stake-cpu "50000000.0000 SYS" --buy-ram-kbytes 8192
- cleos system newaccount --transfer eosio produce.four  
EOS5y3Tm1czTCia3o3JidVKmC78J9gRQU8qHjmRjFxFtyhh2vxvF5d --stake-net  
"50000000.0000 SYS" --stake-cpu "50000000.0000 SYS" --buy-ram-kbytes 8192
- cleos system regproducer producer.one  
EOS8imf2TDq6FKtLZ8mvXPWcd6EF2rQwo8zKdLNzsbU9EiMSt9Lwz

- ```
https://producer.one.com/EOS8imf2TDq6FKtLZ8mvXPWcd6EF2rQwo8zKdLNzsbU9EiMS
t9Lwz
```
- cleos system regproducer producer.two  
EOS7Ef4kuyTbXbtSPP5Bgethvo6pbitpuEz2RMWhXb8LXxEgcR7MC  
https://producer.two.com/EOS7Ef4kuyTbXbtSPP5Bgethvo6pbitpuEz2RMWhXb8LXxEgcR7MC
  - cleos system regproducer produc.three  
EOS5n442Qz4yVc4LbdPCDnxNSseAiUCrNjRxAfPhUvM8tWS5svid6  
https://produc.three.com/EOS5n442Qz4yVc4LbdPCDnxNSseAiUCrNjRxAfPhUvM8tWS5svid6
  - cleos system regproducer produce.four  
EOS5y3Tm1czTCia3o3JidVKmC78J9gRQU8qHjmRjFxFyhh2vxxvF5d  
<https://produce.four.com/EOS5y3Tm1czTCia3o3JidVKmC78J9gRQU8qHjmRjFxFyhh2vxxvF5d>
  - cleos system listproducers
  - mkdir nodes/01-node nodes/02-node nodes/03-node nodes/04-node
  - nodeos \
  - --plugin eosio::http\_plugin --plugin eosio::chain\_api\_plugin --plugin eosio::chain\_plugin --plugin eosio::producer\_api\_plugin --plugin eosio::producer\_plugin --plugin eosio::history\_plugin --plugin eosio::history\_api\_plugin --plugin eosio::net\_api\_plugin \
  - --contracts-console \
  - --max-transaction-time=200 \
  - --chain-state-db-size-mb 1024 \
  - --enable-stale-production \
  - --producer-name producer.one \
  - --genesis-json ~/nodes/genesis.json \
  - --blocks-dir ~/nodes/01-node/blocks \
  - --config-dir ~/nodes/01-node \
  - --data-dir ~/nodes/01-node \
  - --http-server-address 127.0.0.1:8889 \
  - --p2p-listen-endpoint 127.0.0.1:9877 \
  - --signature-provider  
EOS8imf2TDq6FKtLZ8mvXPWcd6EF2rQwo8zKdLNzsbU9EiMSSt9Lwz=KEY:5KLGj1HGRWbk5xNmKfrcrQHxvcVJBpAckoiJgFftXSJjLPp7b \
  - --p2p-peer-address 127.0.0.1:9876 \
  - >>~/nodes/01-node/01.log 2>&1 &
  - cat nodes/01-node/01.log | grep :9876 -C 3
  - nodeos \
  - --plugin eosio::http\_plugin --plugin eosio::chain\_api\_plugin --plugin eosio::chain\_plugin --plugin eosio::producer\_api\_plugin --plugin eosio::producer\_plugin --plugin eosio::history\_plugin --plugin eosio::history\_api\_plugin --plugin eosio::net\_api\_plugin \
  - --contracts-console \
  - --max-transaction-time=200 \
  - --chain-state-db-size-mb 1024 \
  - --enable-stale-production \
  - --producer-name producer.two \
  - --genesis-json ~/nodes/genesis.json \
  - --blocks-dir ~/nodes/02-node/blocks \
  - --config-dir ~/nodes/02-node \

- --data-dir ~/nodes/02-node \
- --http-server-address 127.0.0.1:8890 \
- --p2p-listen-endpoint 127.0.0.1:9878 \
- --signature-provider  
EOS7Ef4kuyTbXbtSPP5Bgethvo6pbitpuEz2RMWhXb8LXxEgcR7MC=KEY:5K6qk1KaCY  
YWX86UhAfUsbMwhGPUqrqHrZEqDjs9ekP5j6LgHUu \
- --p2p-peer-address 127.0.0.1:9876 \
- --p2p-peer-address 127.0.0.1:9877 \
- >>~/nodes/02-node/02.log 2>&1 &
- cat nodes/02-node/02.log | grep :9877 -C 3
- nodeos \
- --plugin eosio::http\_plugin --plugin eosio::chain\_api\_plugin --plugin eosio::chain\_plugin --  
plugin eosio::producer\_api\_plugin --plugin eosio::producer\_plugin --plugin  
eosio::history\_plugin --plugin eosio::history\_api\_plugin --plugin eosio::net\_api\_plugin \
- --contracts-console \
- --max-transaction-time=200 \
- --chain-state-db-size-mb 1024 \
- --enable-stale-production \
- --producer-name produc.three \
- --genesis-json ~/nodes/genesis.json \
- --blocks-dir ~/nodes/03-node/blocks \
- --config-dir ~/nodes/03-node \
- --data-dir ~/nodes/03-node \
- --http-server-address 127.0.0.1:8891 \
- --p2p-listen-endpoint 127.0.0.1:9879 \
- --signature-provider  
EOS5n442Qz4yVc4LbdPCDnxNSseAiUCrNjRxAfPhUvM8tWS5svid6=KEY:5JCStvbRgU  
Z6hjyfUiUaxt5iU3HP6zC1kwx3W7SweaEGvs4EPfQ \
- --p2p-peer-address 127.0.0.1:9876 \
- --p2p-peer-address 127.0.0.1:9877 \
- --p2p-peer-address 127.0.0.1:9878 \
- >>~/nodes/03-node/03.log 2>&1 &
- cat nodes/03-node/03.log | grep :9878 -C 3
- nodeos \
- --plugin eosio::http\_plugin --plugin eosio::chain\_api\_plugin --plugin eosio::chain\_plugin --  
plugin eosio::producer\_api\_plugin --plugin eosio::producer\_plugin --plugin  
eosio::history\_plugin --plugin eosio::history\_api\_plugin --plugin eosio::net\_api\_plugin \
- --contracts-console \
- --max-transaction-time=200 \
- --chain-state-db-size-mb 1024 \
- --enable-stale-production \
- --producer-name produce.four \
- --genesis-json ~/nodes/genesis.json \
- --blocks-dir ~/nodes/04-node/blocks \
- --config-dir ~/nodes/04-node \
- --data-dir ~/nodes/04-node \
- --http-server-address 127.0.0.1:8892 \
- --p2p-listen-endpoint 127.0.0.1:9880 \



- --signature-provider  
EOS5y3Tm1czTCia3o3JidVKmC78J9gRQU8qHjmRjFxFxTyhh2vxvF5d=KEY:5JJjaKnAb9KM2vkkJDgrYXoeUEdGgWtB5WK1a38wrmKnS3KtkS6 \
- --p2p-peer-address 127.0.0.1:9876 \
- --p2p-peer-address 127.0.0.1:9877 \
- --p2p-peer-address 127.0.0.1:9878 \
- --p2p-peer-address 127.0.0.1:9879 \
- >>~/nodes/04-node/04.log 2>&1 &
- cat nodes/04-node/04.log | grep :9879 -C 3
- cleos system voteproducer prods producer.one producer.one producer.two produc.three produce.four
- cleos system voteproducer prods producer.two producer.two produc.three produce.four
- cleos system voteproducer prods produc.three produc.three produce.four
- cleos system voteproducer prods produce.four produce.four
- cleos system listproducers
- tail -f nodes/01-node/01.log | grep Produced
- tail -f nodes/00-boot/00.log | grep Produced
- cleos get account eosio
- cleos push action eosio updateauth '{"account": "eosio", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio.prods", "permission": "active"}}]}' -p eosio@owner
- cleos push action eosio updateauth '{"account": "eosio", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio.prods", "permission": "active"}}]}' -p eosio@active
- cleos get account eosio
- cleos push action eosio updateauth '{"account": "eosio.bpay", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.bpay@owner
- cleos push action eosio updateauth '{"account": "eosio.bpay", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.bpay@active
- cleos push action eosio updateauth '{"account": "eosio.msigs", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.msigs@owner
- cleos push action eosio updateauth '{"account": "eosio.msigs", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.msigs@active
- cleos push action eosio updateauth '{"account": "eosio.names", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.names@owner
- cleos push action eosio updateauth '{"account": "eosio.names", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.names@active
- cleos push action eosio updateauth '{"account": "eosio.ram", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.ram@owner
- cleos push action eosio updateauth '{"account": "eosio.ram", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.ram@active

- cleos push action eosio updateauth '{"account": "eosio.ramfee", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.ramfee@owner
- cleos push action eosio updateauth '{"account": "eosio.ramfee", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.ramfee@active
- cleos push action eosio updateauth '{"account": "eosio.saving", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.saving@owner
- cleos push action eosio updateauth '{"account": "eosio.saving", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.saving@active
- cleos push action eosio updateauth '{"account": "eosio.stake", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.stake@owner
- cleos push action eosio updateauth '{"account": "eosio.stake", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.stake@active
- cleos push action eosio updateauth '{"account": "eosio.token", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.token@owner
- cleos push action eosio updateauth '{"account": "eosio.token", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.token@active
- cleos push action eosio updateauth '{"account": "eosio.vpay", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.vpay@owner
- cleos push action eosio updateauth '{"account": "eosio.vpay", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.vpay@active
- cleos push action eosio updateauth '{"account": "eosio.rex", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p eosio.rex@owner
- cleos push action eosio updateauth '{"account": "eosio.rex", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": [], "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}}' -p [eosio.rex@active](#)



## OUTPUT:

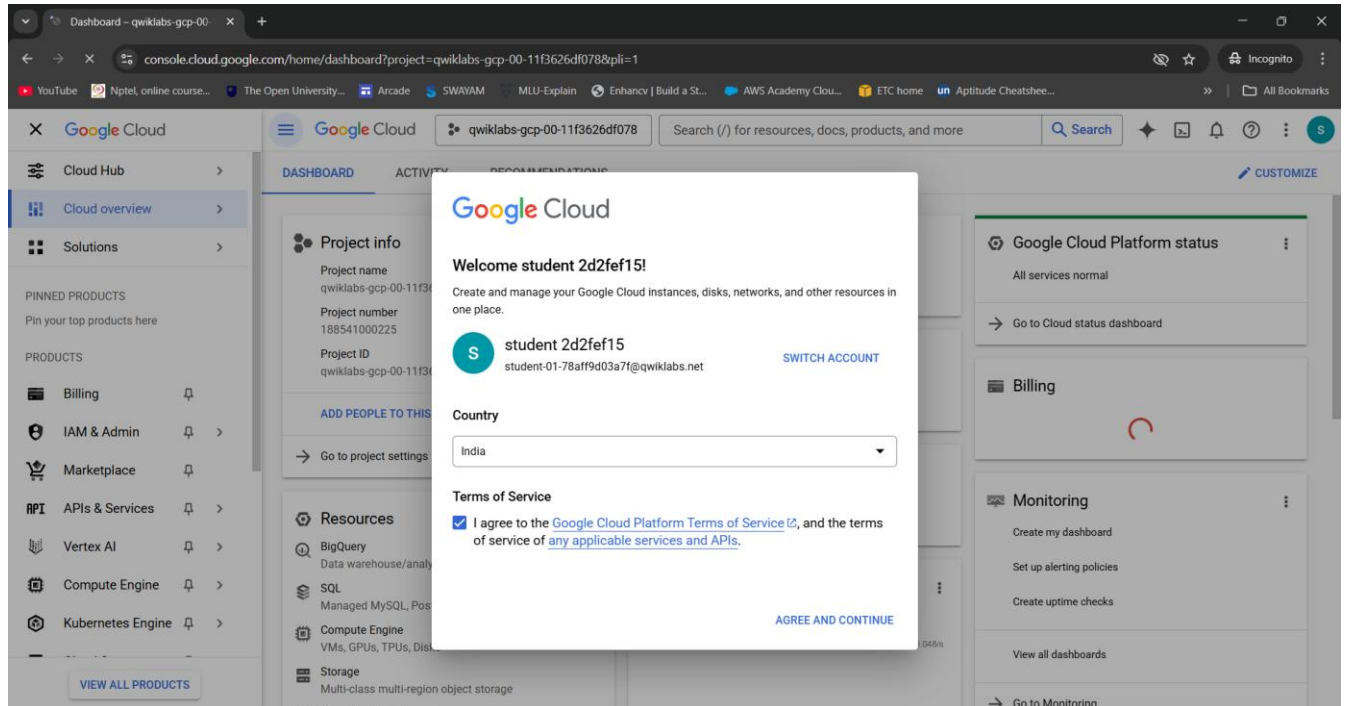


Figure 1: Start Lab

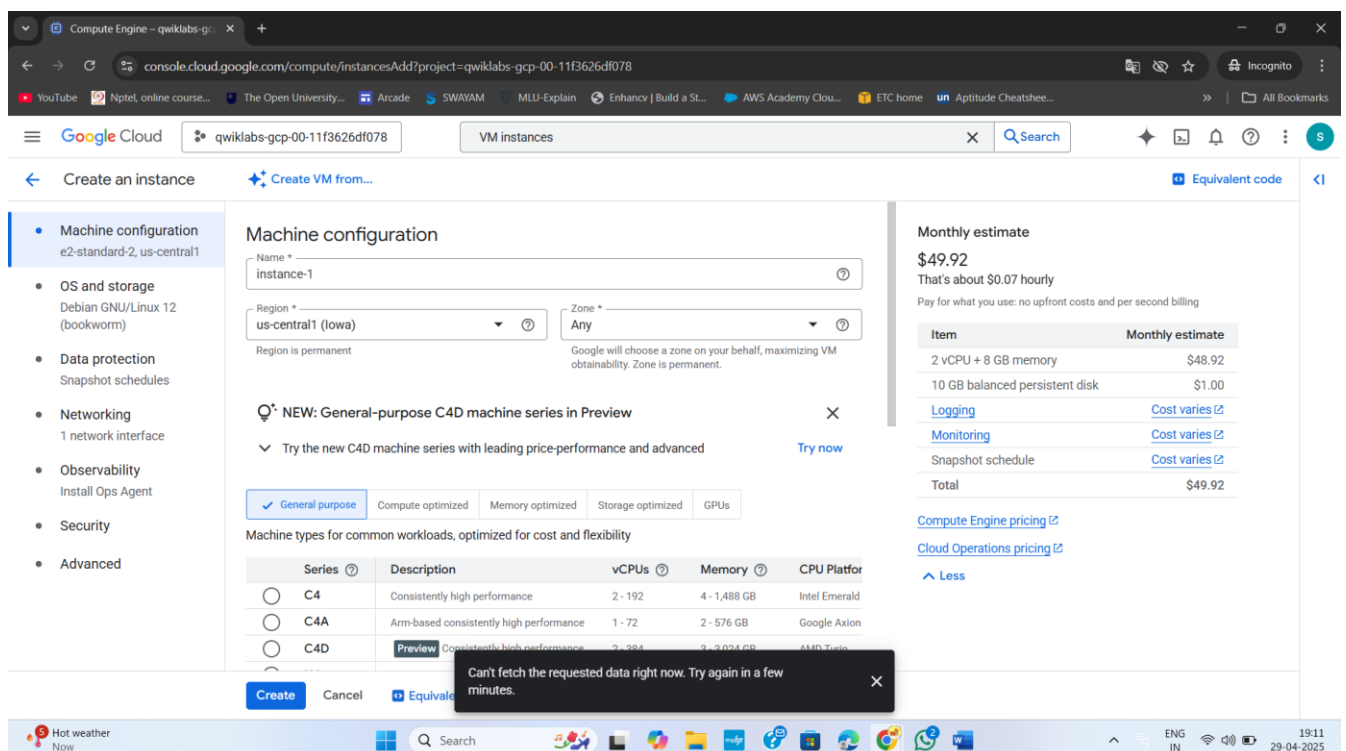


Figure 2: Create a VM instance

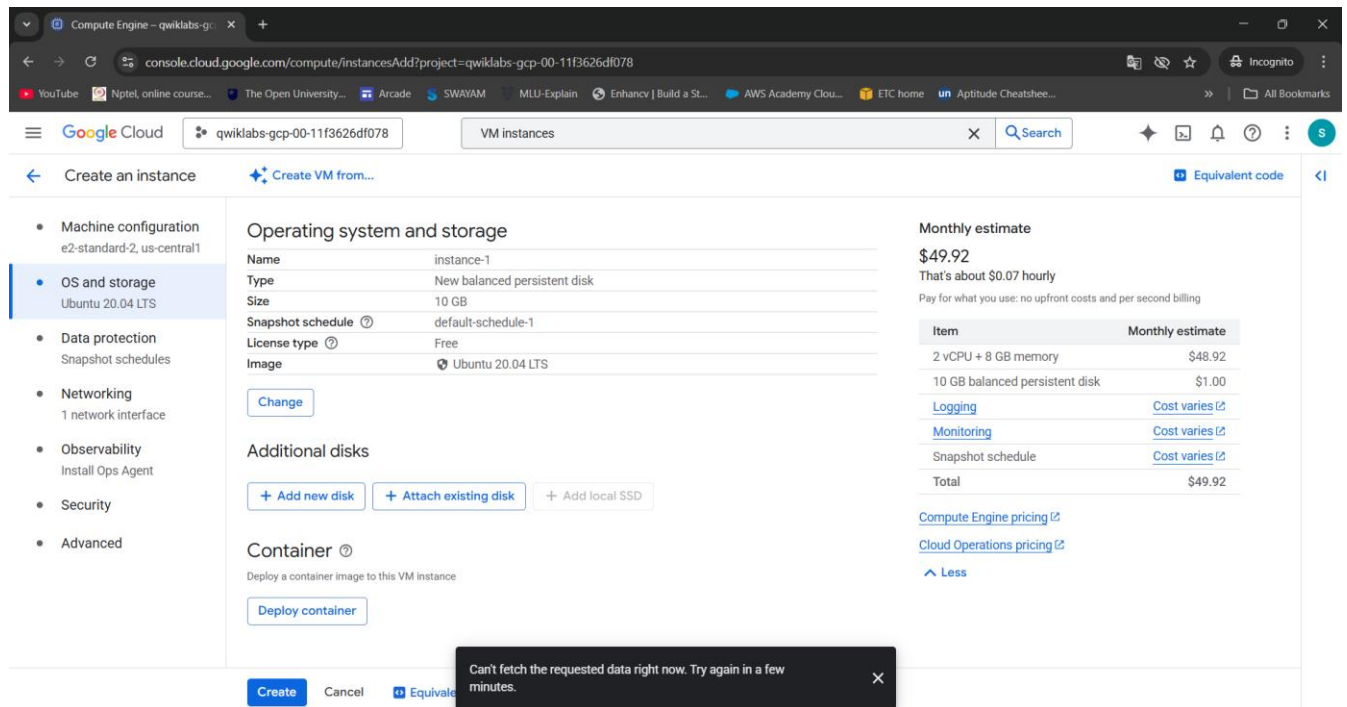


Figure 3: Change operating system to Linux

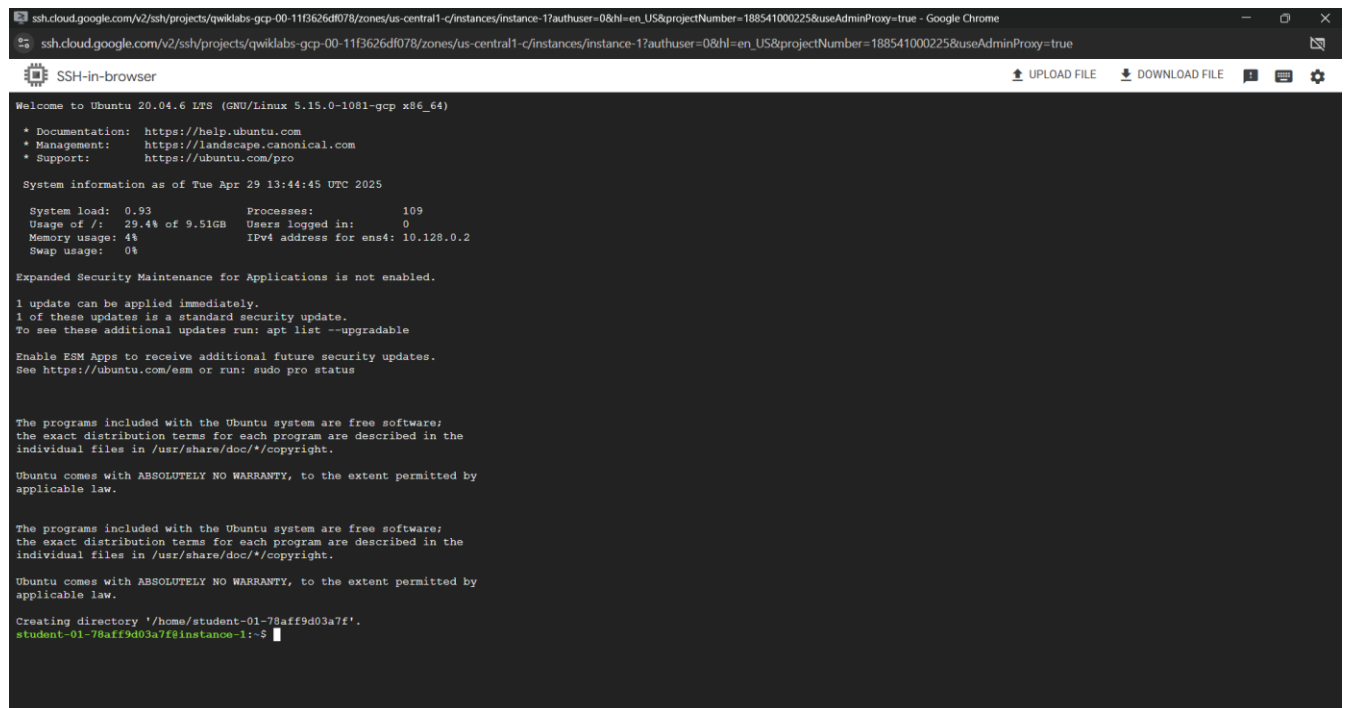


Figure 4: Connect VM with SSH

```

Building dependency tree
Reading state information... Done
7 packages can be upgraded. Run 'apt list --upgradable' to see them.
student-01-78aff9d03a7f@instance-1:~$ curl -LO https://github.com/eosio/eosio/releases/download/v2.1.0/eosio_2.1.0-1-ubuntu-20.04_amd64.deb
% Total % Received % Xferd Average Speed Time Time Current
0 0
100 33.6M 100 33.6M 0 0 45.0M 0
student-01-78aff9d03a7f@instance-1:~$ sudo apt install ./eosio_2.1.0-1-ubuntu-20.04_amd64.deb
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'eosio' instead of './eosio_2.1.0-1-ubuntu-20.04_amd64.deb'
The following additional packages will be installed:
  libpq5 libtinfo5
The following NEW packages will be installed:
  eosio libpq5 libtinfo5
0 upgraded, 3 newly installed, 0 to remove and 7 not upgraded.
Need to get 201 kB/35.4 MB of archives.
After this operation, 952 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://us-central1-gce.archive.ubuntu.com/ubuntu focal-updates/universe amd64 libtinfo5 amd64 6.2-0ubuntu2.1 [83.4 kB]
Get:2 http://us-central1-gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpq5 amd64 12.22-0ubuntu0.20.04.2 [118 kB]
Get:3 /home/student-01-78aff9d03a7f/eosio_2.1.0-1-ubuntu-20.04_amd64.deb eosio amd64 2.1.0-1 [35.2 MB]
Fetched 201 kB in 0s (588 kB/s)
Selecting previously unselected package libtinfo5:amd64.
(Reading database ... 62498 files and directories currently installed.)
Preparing to unpack .../libtinfo5_6.2-0ubuntu2.1_amd64.deb ...
Unpacking libtinfo5:amd64 (6.2-0ubuntu2.1) ...
Selecting previously unselected package libpq5:amd64.
Preparing to unpack .../libpq5_12.22-0ubuntu0.20.04.2_amd64.deb ...
Unpacking libpq5:amd64 (12.22-0ubuntu0.20.04.2) ...
Selecting previously unselected package eosio.
Preparing to unpack .../eosio_2.1.0-1-ubuntu-20.04_amd64.deb ...
Unpacking eosio (2.1.0-1) ...
Setting up libpq5:amd64 (12.22-0ubuntu0.20.04.2) ...
Setting up libtinfo5:amd64 (6.2-0ubuntu2.1) ...
Setting up eosio (2.1.0-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.17) ...
student-01-78aff9d03a7f@instance-1:~$ nodeos --version
v2.1.0
student-01-78aff9d03a7f@instance-1:~$ cleos version client
v2.1.0
student-01-78aff9d03a7f@instance-1:~$ keosd -v
v2.1.0
student-01-78aff9d03a7f@instance-1:~$

```

Figure 5: Install the EOSIO platform

```

v2.1.0
student-01-78aff9d03a7f@instance-1:~$ keosd --unlock-timeout 999999999 &
[1] 2962
student-01-78aff9d03a7f@instance-1:~$ info 2025-04-29T13:46:48.759 keosd wallet_plugin.cpp:84 plugin_initialize } initializing wallet plugin
info 2025-04-29T13:46:48.759 keosd wallet_api_plugin.cpp:84 plugin_startup } starting wallet_api plugin
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/create
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/create_key
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/get_public_keys
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/import_key
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/list_keys
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/list_wallets
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/lock
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/lock_all
info 2025-04-29T13:46:48.759 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/open
info 2025-04-29T13:46:48.760 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/remove_key
info 2025-04-29T13:46:48.760 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/set_timeout
info 2025-04-29T13:46:48.760 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/sign_digest
info 2025-04-29T13:46:48.760 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/sign_transaction
info 2025-04-29T13:46:48.760 keosd http_plugin.cpp:983 add_handler } add api url: /v1/wallet/unlock
info 2025-04-29T13:46:48.760 keosd http_plugin.cpp:983 add_handler } add api url: /v1/node/get_supported_apis
student-01-78aff9d03a7f@instance-1:~$ cleos wallet create --file my_wallet_password
warn 2025-04-29T13:47:03.607 keosd wallet.cpp:218 save_wallet_file } saving wallet to file /home/student-01-78aff9d03a7f/eosio-wallet/./default.wallet
Creating wallet: default
Save password to use in the future to unlock this wallet.
Without password imported keys will not be retrievable.
saving password to my_wallet_password
student-01-78aff9d03a7f@instance-1:~$ cleos wallet list
wallets:
{
  "default **"
}
student-01-78aff9d03a7f@instance-1:~$

```

Figure 6: Create a default wallet

```

student-01-78aff9d03a7f@instance-1:~$ cleos wallet open
Opened: default
student-01-78aff9d03a7f@instance-1:~$ cleos wallet unlock <my_wallet_password
password: Unlocked: default
student-01-78aff9d03a7f@instance-1:~$ cleos wallet import --private-key 5KQwrPbwdL6PhuujxN377SSGN1JiwvS4cGQcDeYXtP792kVfD3
warn 2025-04-29T13:48:30.274 keosd wallet.cpp:218 save_wallet_file } saving wallet to file /home/student-01-78aff9d03a7f/eosio-wallet/./default.wallet
imported private key for: EOS6MRyAJQgBjDd7hVNYcfvPjQcVpScN5So8BhtHuGyqETSGW5CV
student-01-78aff9d03a7f@instance-1:~$

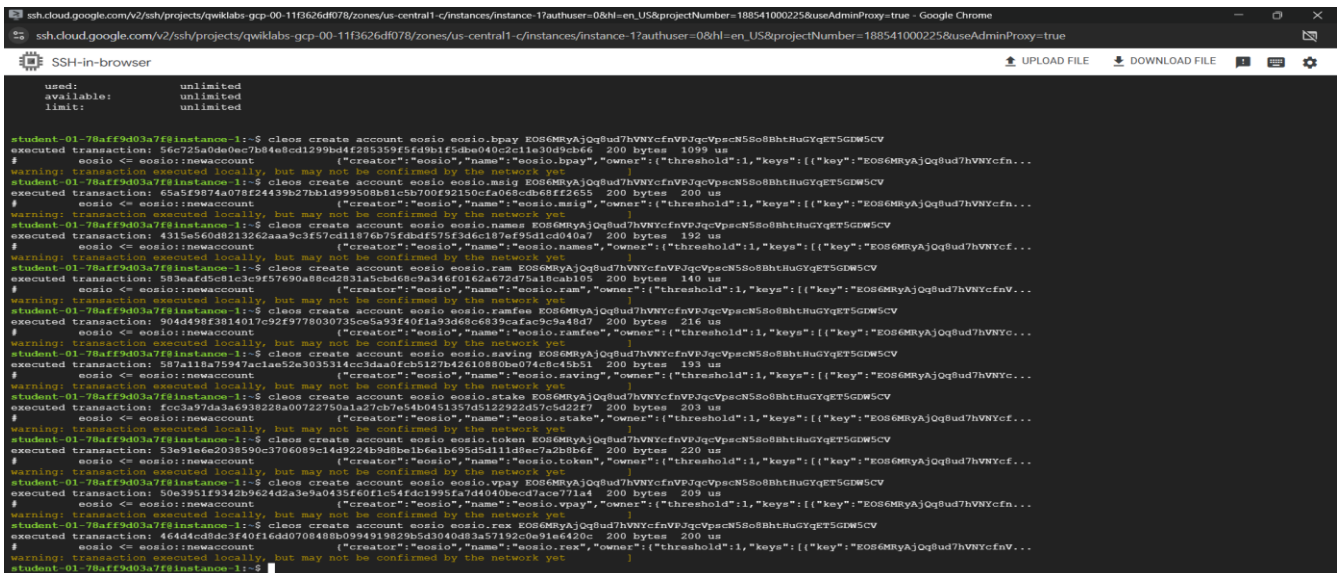
```

Figure 7: Add the private key of the EOSIO system account to the wallet

Figure 8: Install the EOSIO Contract Development Toolkit (CDT)

*Figure 9: Install CMake*

Figure 10: Build the system contracts and `eosio.boot`



*Figure 11: Start the boot node and create system accounts*

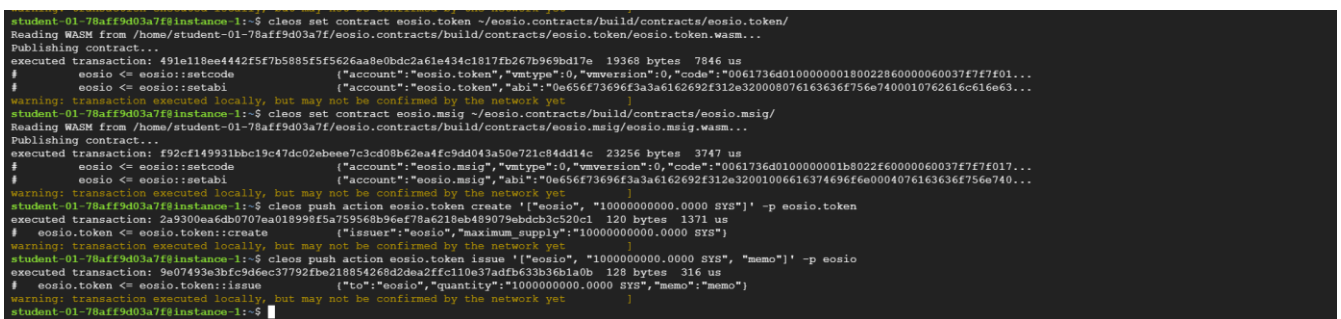


Figure 12: Deploy the *eosio.token*, *eosio.msig* contracts, and create/issue the SYS token

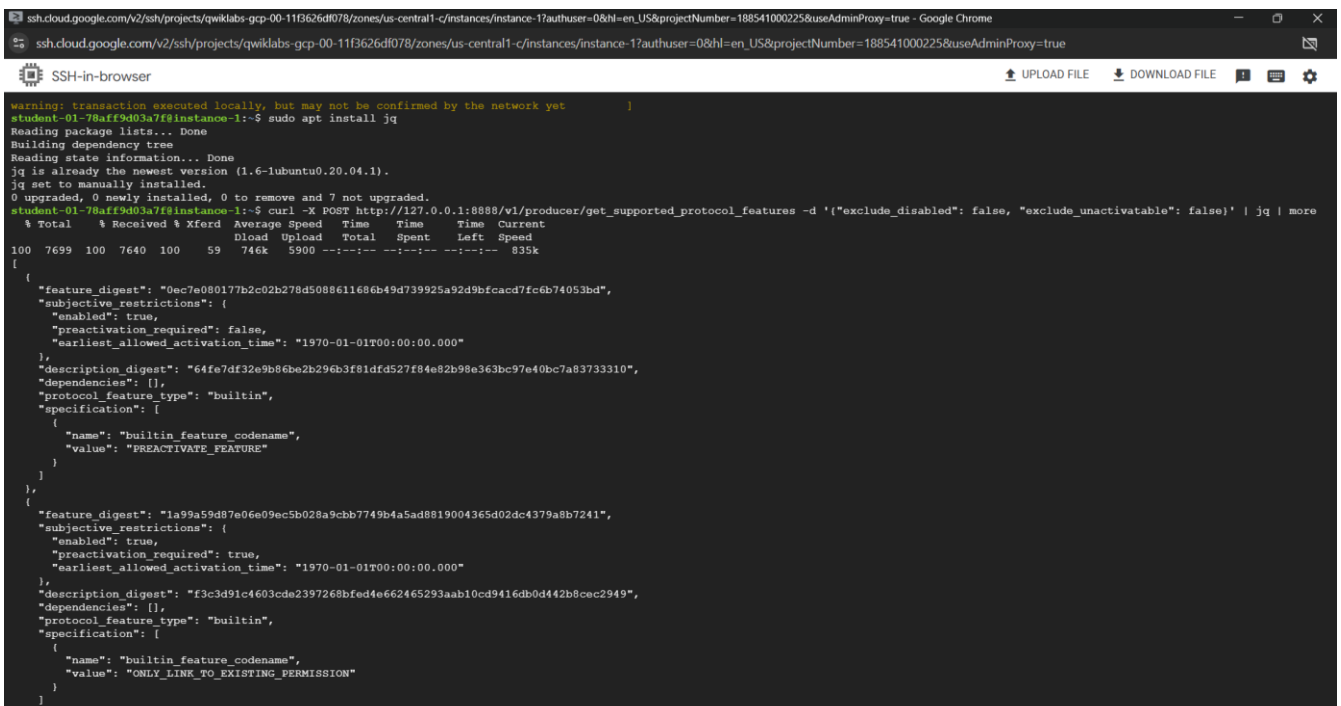
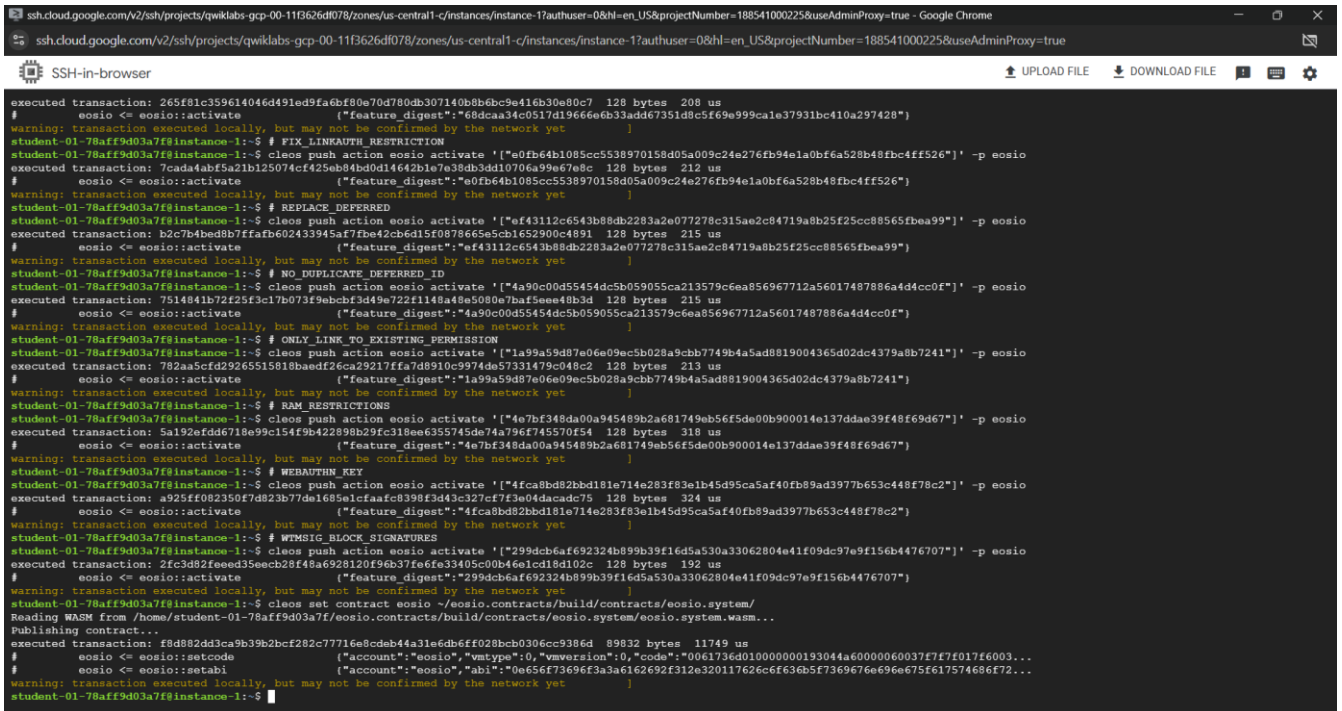


Figure 13: Command sends an HTTP POST request to the `get_supported_protocol_features` endpoint provided by the Producer API plugin





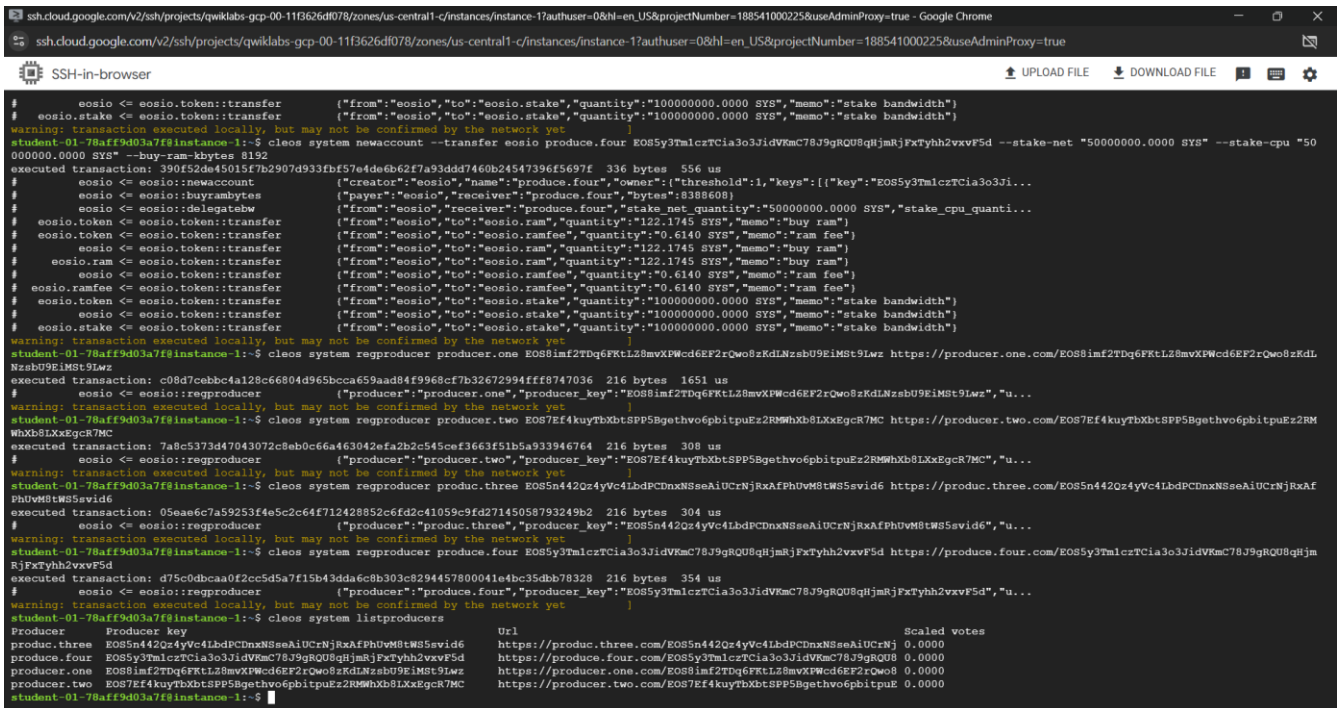
```

ssh.cloud.google.com/v2/ssh/projects/qwiklabs-gcp-00-11f3626d078/zones/us-central1-c/instances/instance-1?authuser=0&hl=en_US&projectNumber=188541000225&useAdminProxy=true
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE

executed transaction: 265f81c359614046491ed9fa6bf80e70d780db307140b8b6bc9e416b30e80c7 120 bytes 208 us
# eosio <= eosio::activate ("feature_digest":"68dca34c0517d1966e6b33add67351d8c5f69e999cale37931bc410a297428")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # FIX LINKAUTH RESTRICTION
student-01-78aff9d03a7f8instance-1:~$ cleos push action eosio activate '{"efbf64b1085cc538970158d05a009c24e276f94e1a0bf6a528b48fbc4ff526"}' -p eosio
executed transaction: 70cd44bf52b2125074cf425eb4b40d41640b1e7e3b8d34d10706a99e67edc 128 bytes 212 us
# eosio <= eosio::activate ("feature_digest":"ef43112c6543b88db2283a2e077278c315ae2c84719a8b25f25cc88565fba99")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # REPLACE DEFERRED
student-01-78aff9d03a7f8instance-1:~$ cleos push action eosio activate '{"ef43112c6543b88db2283a2e077278c315ae2c84719a8b25f25cc88565fba99"}' -p eosio
executed transaction: b2c7b4bed8b7ffaf602433945af7f6e42cb6d15f08786e5e5cb1652900c4891 128 bytes 215 us
# eosio <= eosio::activate ("feature_digest":"ef43112c6543b88db2283a2e077278c315ae2c84719a8b25f25cc88565fba99")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # NO DUPLICATE DEFERRED ID
student-01-78aff9d03a7f8instance-1:~$ cleos push action eosio activate '{"4a90c00d55454dc5b059055ca213579c6ea856967712a56017487886a4d4cc0f"}' -p eosio
executed transaction: 7514841b72f25f3c17b073f9ebcb3d49e722f1148a48e5080e7baf5ee48b3d 128 bytes 215 us
# eosio <= eosio::activate ("feature_digest":"4a90c00d55454dc5b059055ca213579c6ea856967712a56017487886a4d4cc0f")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # ONLY LINK TO EXISTING PERMISSION
student-01-78aff9d03a7f8instance-1:~$ cleos push action eosio activate '{"1a99a59d87e06e09ec5b028a9cbb7749b4a5ad8819004365d02dc4379a8b7241"}' -p eosio
executed transaction: 782aa5cfd2926515818baedf26ca29217ffa7d8910c9974de57331479c048c2 128 bytes 213 us
# eosio <= eosio::activate ("feature_digest":"1a99a59d87e06e09ec5b028a9cbb7749b4a5ad8819004365d02dc4379a8b7241")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # RAM RESTRICTIONS
student-01-78aff9d03a7f8instance-1:~$ cleos push action eosio activate '{"4e7bf348da00a945489b2a681749eb56f5de0b900014e137ddae39f48f69d67"}' -p eosio
executed transaction: 5a192efdd6718e99c154f9b22898b29fc318ee6355745de74a796f745570f54 128 bytes 318 us
# eosio <= eosio::activate ("feature_digest":"4e7bf348da00a945489b2a681749eb56f5de0b900014e137ddae39f48f69d67")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # WENADITH XYZ
student-01-78aff9d03a7f8instance-1:~$ cleos push action eosio activate '{"4fc8a8bd2b2bd181e714e283f83e1b45d95ca5af40fb9ad3977b653c448f78c2"}' -p eosio
executed transaction: a925f082350f7d823b7de1685elcfaafcf398f3d43c327cf7f3e04dadac75 128 bytes 324 us
# eosio <= eosio::activate ("feature_digest":"4fc8a8bd2b2bd181e714e283f83e1b45d95ca5af40fb9ad3977b653c448f78c2")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # RAM RESTRICTIONS
student-01-78aff9d03a7f8instance-1:~$ cleos push action eosio activate '{"299dcba6f692324b899b39f16d5a530a3362804e41f09dc97e9f156b4476707"}' -p eosio
executed transaction: 2fc382fe0ed35eeb28f48a6928120f96b37fe6f33405c0b046e1cd18d102c 128 bytes 192 us
# eosio <= eosio::activate ("feature_digest":"299dcba6f692324b899b39f16d5a530a3362804e41f09dc97e9f156b4476707")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ # eosio <= eosio::setcode
Reading WASM from /home/student-01-78aff9d03a7f8instance-1:~$ eosio.contracts/build/contracts/eosio.system/
Publishing contract
executed transaction: f8882d3d3ca9b39b2b2cf282c7771e68cdeb44a31e6db6ff028bcb0306cc9386d 89832 bytes 11749 us
# eosio <= eosio::setcode ("account":"eosio", "vmversion":0, "code":"0061736d01000000019304a60000060037f7f017f6003...")
# eosio <= eosio::setabi ("account":"eosio", "abi":"0e656f73696f3a3a6162692f312e32011762ec6f636bf7369676e696e675f617574686f72...")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$

```

Figure 14: Activate protocol features and deploy eosio.boot and eosio.system contracts



```

ssh.cloud.google.com/v2/ssh/projects/qwiklabs-gcp-00-11f3626d078/zones/us-central1-c/instances/instance-1?authuser=0&hl=en_US&projectNumber=188541000225&useAdminProxy=true
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE

# eosio <= eosio.token:transfer ("from":"eosio", "to":"eosio.stake", "quantity":"100000000.0000 SYS", "memo":"stake bandwidth")
# eosio.stake <= eosio.token:transfer ("from":"eosio", "to":"eosio.stake", "quantity":"100000000.0000 SYS", "memo":"stake bandwidth")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ cleos system newaccount --transfer eosio produce.four EOS5y3TmlczTCia3o3JidVkmC78J9gRQ08qHjmrJFxythh2vxf5d --stake-net "500000000.0000 SYS" --stake-cpu "5000000.0000 SYS" --buy-ram-kbytes 8192
executed transaction: 390f52de45015f7b2907d933fbf5f7e4de6b2f7a93dd7460b24547396f5697f 336 bytes 556 us
# eosio <= eosio::newaccount ("creator":"eosio", "name":"produce.four", "owner":{"threshold":1, "keys":[{"key":"EOS5y3TmlczTCia3o3JidVkmC78J9gRQ08qHjmrJFxythh2vxf5d"}]}, "payer":"eosio", "receiver":"produce.four", "bytes":{"RAM":8192})
# eosio <= eosio::delegatebw ("from":"eosio", "receiver":"produce.four", "stake_net_quantity":"50000000.0000 SYS", "stake_cpu_quantit...")
# eosio.token <= eosio.token:transfer ("from":"eosio", "to":"eosio.ram", "quantity":"122.1745 SYS", "memo":"buy ram")
# eosio.token <= eosio.token:transfer ("from":"eosio", "to":"eosio.ramfee", "quantity":"0.6140 SYS", "memo":"ram fee")
# eosio.ram <= eosio.token:transfer ("from":"eosio", "to":"eosio.ram", "quantity":"122.1745 SYS", "memo":"buy ram")
# eosio.ram <= eosio.token:transfer ("from":"eosio", "to":"eosio.ramfee", "quantity":"0.6140 SYS", "memo":"ram fee")
# eosio.ramfee <= eosio.token:transfer ("from":"eosio", "to":"eosio.ramfee", "quantity":"0.6140 SYS", "memo":"ram fee")
# eosio.token <= eosio.token:transfer ("from":"eosio", "to":"eosio.stake", "quantity":"100000000.0000 SYS", "memo":"stake bandwidth")
# eosio.token <= eosio.token:transfer ("from":"eosio", "to":"eosio.stake", "quantity":"100000000.0000 SYS", "memo":"stake bandwidth")
# eosio.stake <= eosio.token:transfer ("from":"eosio", "to":"eosio.stake", "quantity":"100000000.0000 SYS", "memo":"stake bandwidth")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ cleos system regproducer producer.one EOS8imf2TdQ6FKtL28mVXFWcd6EF2rQw08zKdLNzabU9EIMSt9Lwz https://producer.one.com/EOS8imf2TdQ6FKtL28mVXFWcd6EF2rQw08zKdLNzabU9EIMSt9Lwz
executed transaction: c08d7cebb4a128c66804d965bcca659aad84f9968cf7b32672994fff8747036 216 bytes 1651 us
# eosio <= eosio::regproducer ("producer":"producer.one", "producer_key":"EOS8imf2TdQ6FKtL28mVXFWcd6EF2rQw08zKdLNzabU9EIMSt9Lwz", "u...")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ cleos system regproducer producer.two EOS7Ef4kuyTxBtSP5Sgethvo6bptpuEz2RMWhXb8LXxEgcR7MC https://producer.two.com/EOS7Ef4kuyTxBtSP5Sgethvo6bptpuEz2RMWhXb8LXxEgcR7MC
executed transaction: 7a8c5373d47043072c8eb0c66a463042efa2b2c54cef3663f51b5a933946764 216 bytes 308 us
# eosio <= eosio::regproducer ("producer":"producer.two", "producer_key":"EOS7Ef4kuyTxBtSP5Sgethvo6bptpuEz2RMWhXb8LXxEgcR7MC", "u...")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ cleos system regproducer producer.three EOS5n442Qz4yVc4LbdPCDmXNSseAIUCrNjRxAfPhUvM8tWS5avid6 https://produc.three.com/EOS5n442Qz4yVc4LbdPCDmXNSseAIUCrNjRxAfPhUvM8tWS5avid6
executed transaction: 05ae6c7a59253f4e5c2c64f712428852c6fd2c41059c9fd27145058793249b2 216 bytes 304 us
# eosio <= eosio::regproducer ("producer":"producer.three", "producer_key":"EOS5n442Qz4yVc4LbdPCDmXNSseAIUCrNjRxAfPhUvM8tWS5avid6", "u...")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ cleos system regproducer producer.four EOS5y3TmlczTCia3o3JidVkmC78J9gRQ08qHjmrJFxythh2vxf5d https://producer.four.com/EOS5y3TmlczTCia3o3JidVkmC78J9gRQ08qHjmrJFxythh2vxf5d
executed transaction: d75cd0bca0f2cc5d5a7f15b43dda6c8b303c8294457800041e4bc35dbb78328 216 bytes 354 us
# eosio <= eosio::regproducer ("producer":"producer.four", "producer_key":"EOS5y3TmlczTCia3o3JidVkmC78J9gRQ08qHjmrJFxythh2vxf5d", "u...")
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8instance-1:~$ cleos system listproducers
Producer Producer key Url Scaled votes
produce.three EOS5n442Qz4yVc4LbdPCDmXNSseAIUCrNjRxAfPhUvM8tWS5avid6 https://producer.three.com/EOS5n442Qz4yVc4LbdPCDmXNSseAIUCrNjRxAfPhUvM8tWS5avid6 0.0000
produce.four EOS5y3TmlczTCia3o3JidVkmC78J9gRQ08qHjmrJFxythh2vxf5d https://producer.four.com/EOS5y3TmlczTCia3o3JidVkmC78J9gRQ08qHjmrJFxythh2vxf5d 0.0000
producer.one EOS8imf2TdQ6FKtL28mVXFWcd6EF2rQw08zKdLNzabU9EIMSt9Lwz https://producer.one.com/EOS8imf2TdQ6FKtL28mVXFWcd6EF2rQw08zKdLNzabU9EIMSt9Lwz 0.0000
producer.two EOS7Ef4kuyTxBtSP5Sgethvo6bptpuEz2RMWhXb8LXxEgcR7MC https://producer.two.com/EOS7Ef4kuyTxBtSP5Sgethvo6bptpuEz2RMWhXb8LXxEgcR7MC 0.0000
student-01-78aff9d03a7f8instance-1:~$

```

Figure 15: Create the block producer accounts



```

ssh.cloud.google.com/v2/ssh/projects/qwiklabs-gcp-00-11f3626d078/zones/us-central1-c/instances/instance-1?authuser=0&hl=en_US&projectNumber=188541000225&useAdminProxy=true
SSH-in-browser
UPLOAD FILE DOWNLOAD FILE
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.saving", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.saving@active
executed transaction: 7d7654d332e3e5e1042a89a7f323e7a3af863d1e986847d011299fd8a437fbc 144 bytes 498 us
# eosio <= eosio::updateauth ('account': "eosio.saving", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.stake", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.stake@owner
executed transaction: d82556d05d7f8d6caf5638153a6151483783fea6712cccf761a95e8f6687f699 144 bytes 474 us
# eosio <= eosio::updateauth ('account': "eosio.stake", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.token", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.token@owner
executed transaction: 4b14b5834d6ff1f2793a50d056185bd3ffad8f7c43a2a457ae3b9b76157661 144 bytes 393 us
# eosio <= eosio::updateauth ('account': "eosio.token", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.token", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.token@active
executed transaction: 06ad1c911a523408ee133f521e6d407eab9190996b0baf3585922f49badi 144 bytes 335 us
# eosio <= eosio::updateauth ('account': "eosio.vpay", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.vpay", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.vpay@owner
executed transaction: bdb0e2bd05304e030eal1ba4e5d15a387494b4b6e932b61bb429db010d41dae 144 bytes 664 us
# eosio <= eosio::updateauth ('account': "eosio.vpay", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.vpay", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.vpay@active
executed transaction: 0d7875df34981ef0a3fc2167b909b76f20db6628e04f6252e06796bf9515aaba 144 bytes 329 us
# eosio <= eosio::updateauth ('account': "eosio.vpay", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.rex", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.rex@owner
executed transaction: 37dcb91cd18ecd95842e7abaad9a8a0b304b31e59bfb60cd9603b24d68cc4e5 144 bytes 412 us
# eosio <= eosio::updateauth ('account': "eosio.rex", "permission": "owner", "parent": "", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$ cleos push action eosio updateauth '{"account": "eosio.rex", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}' -p eosio.rex@active
executed transaction: 8139c9ff44516c9d86240967a9e7379ab2b2624b43a7c10f8726bbf1019cd07 144 bytes 323 us
# eosio <= eosio::updateauth ('account': "eosio.rex", "permission": "active", "parent": "owner", "auth": {"threshold": 1, "keys": [], "waits": []}, "accounts": [{"weight": 1, "permission": {"actor": "eosio", "permission": "active"}}]}'
warning: transaction executed locally, but may not be confirmed by the network yet
student-01-78aff9d03a7f8@instance-1:~$

```

Figure 16: Transition from single-node producer to multi-node producers

Block.one: Creating a Multi Node EOSIO Blockchain

Quick tip: Review the prerequisites before you run the lab

End Lab 00:22:43

Caution: When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked. [Learn more.](#)

[Open Google Cloud Console](#)

Username: student-01-78aff9d03a7f8

Password: NTa92w2obdjK

Project ID: qwiklabs-gcp-00-11f3626d078

In this lab, you will learn how to perform

- Load an existing Compute Engine VM
- Install and build the EOSIO system
- Deploy a multi node blockchain with
- Create user accounts on the EOSIO
- Call an action to transfer tokens am

Prerequisites

Before you start this lab, it is suggested to read the following links:

[Getting Started with the EOSIO Blockchain](#)

It is also recommended to be familiar with the following links:

- [EOSIO Platform and Toolchain](#)
- [EOSIO Core Concepts](#)
- [EOSIO Technical Features](#)

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Lab instructions and tasks

GSP991 100/100

Overview

Setup and requirements

Task 1. Create a virtual machine

Task 2. Install the EOSIO platform

Task 3. Create a default wallet

Task 4. Add the private key of the EOSIO system account to the wallet

Task 5. Install the EOSIO Contract Development Toolkit (CDT)

Task 6. Build the system contracts and eosio.boot

Figure 17: End Lab

## LATEST APPLICATIONS:

- Decentralized Finance (DeFi)
- Supply Chain Management
- Digital Identity Verification
- Digital Voting
- Gaming and NFTs

**LEARNING OUTCOME:**

In this practical, I learned how to deploy a multi-node EOSIO blockchain network and connect nodes using peer-to-peer settings. I managed system contracts, created user accounts, and performed token transfers. I also gained hands-on experience with EOSIO tools like cleos and nodeos, deepening my understanding of decentralized blockchain infrastructures.

**REFERENCES:**

1. <https://www.cloudskillsboost.google/focuses/23108?>