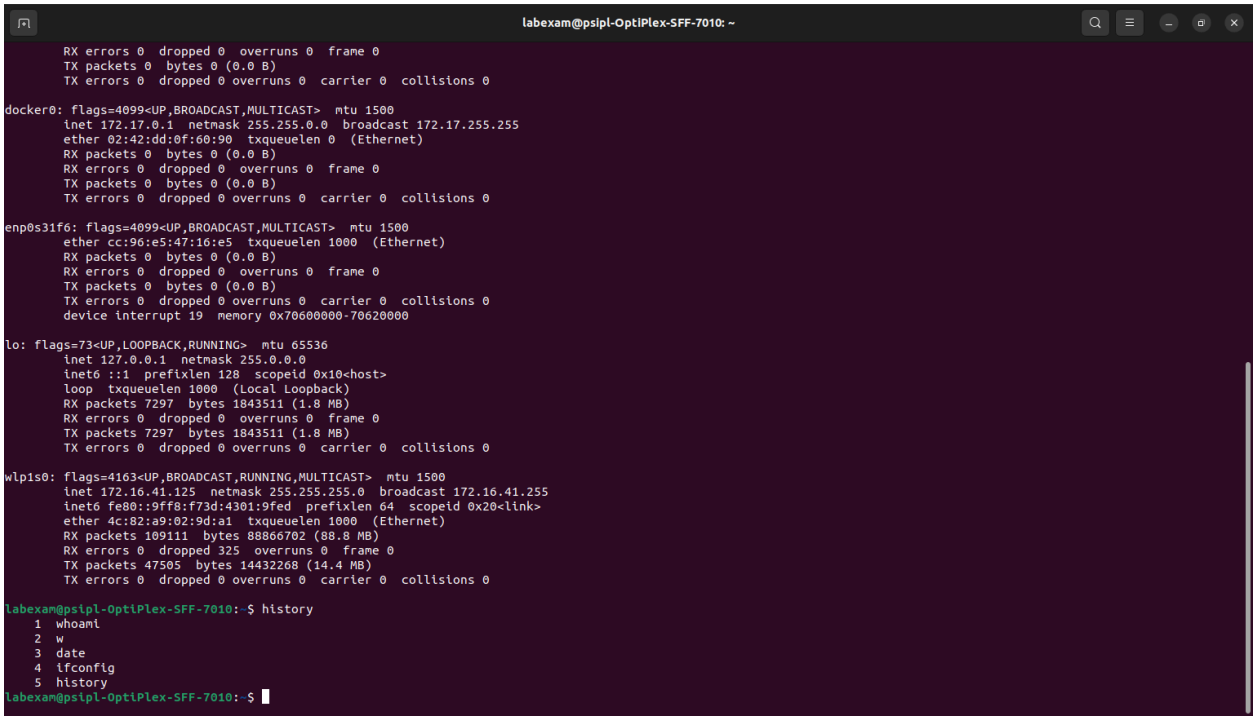
OEIT1- BCT (2023-2024)
Lab ESE

Date: 06/05/2024
Student Name: Prathamesh Mundada
UCID: 2021600047
Branch: CSE-AIML
Sem: 6

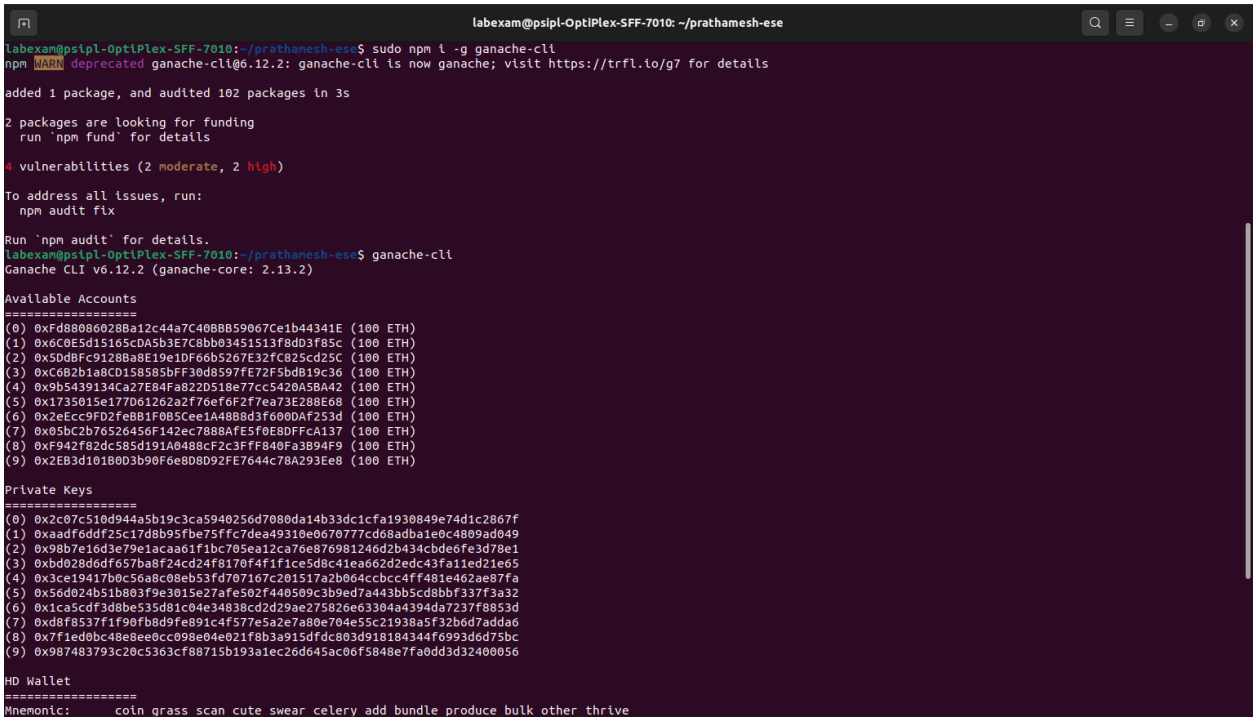
Lab title: Ethereum Blockchain programming- Solidity Language
Brief description of each task with screenshots (caption)

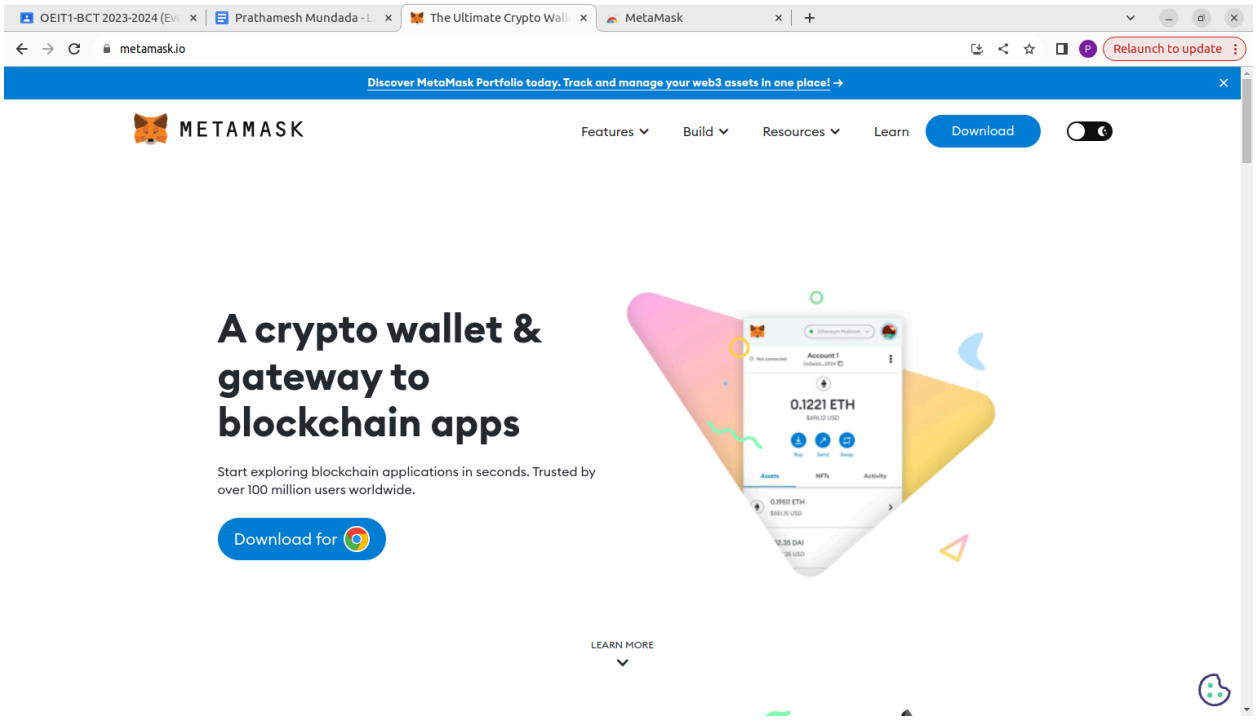
```
labexam@psipl-OptiPlex-SFF-7010:~$ whoami
labexam
labexam@psipl-OptiPlex-SFF-7010:~$ w
 09:24:50 up 20 min,  1 user,  load average: 0.70, 0.54, 0.39
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
labexam  tty2     tty2             09:22   20:42   0.00s  0.00s /usr/libexec/gdm-wayland-session env GNOME_SHELL_SESSION_MODE=ubuntu /usr/bin/gnome-session --session=u
labexam@psipl-OptiPlex-SFF-7010:~$ date
Monday 06 May 2024 09:24:56 AM IST
```

```
labexam@psipl-OptiPlex-SFF-7010: ~
labexam@psipl-OptiPlex-SFF-7010:~$ ifconfig
br-9f3410707b30: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.18.0.1  netmask 255.255.0.0  broadcast 172.18.255.255
        ether 02:42:99:e1:65:5e  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

br-bd9d967e48be: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.24.0.1  netmask 255.255.0.0  broadcast 172.24.255.255
        ether 02:42:fd:09:3b:fa  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

br-d0962c64a932: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.19.0.1  netmask 255.255.0.0  broadcast 172.19.255.255
        ether 02:42:24:87:fe:14  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

br-fe4542ed7868: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.20.0.1  netmask 255.255.0.0  broadcast 172.20.255.255
        ether 02:42:53:2e:4d:0c  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

docker0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        ether 02:42:dd:0f:60:90  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

enp0s31f6: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether cc:96:e5:47:16:e5  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
```


labexam@psipl-OptiPlex-SFF-7010: ~
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
docker0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
inet 172.17.0.1 netmask 255.255.0.0 broadcast 172.17.255.255
ether 02:42:dd:0f:60:90 txqueuelen 0 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
enp0s31f6: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
ether cc:96:e5:47:16:e5 txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 19 memory 0x70600000-70620000
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
inet 127.0.0.1 netmask 255.0.0.0
inet6 ::1 prefixlen 128 scopeid 0x10<host>
loop txqueuelen 1000 (Local Loopback)
RX packets 7297 bytes 1843511 (1.8 MB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 7297 bytes 1843511 (1.8 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
wlp1s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 172.16.41.125 netmask 255.255.255.0 broadcast 172.16.41.255
inet6 fe80::9ff8:f73d:4301:9fed prefixlen 64 scopeid 0x20<link>
ether 4c:82:a9:02:9d:a1 txqueuelen 1000 (Ethernet)
RX packets 109111 bytes 88866702 (88.8 MB)
RX errors 0 dropped 325 overruns 0 frame 0
TX packets 47505 bytes 14432268 (14.4 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
labexam@psipl-OptiPlex-SFF-7010:~$ history
1 whoami
2 w
3 date
4 ifconfig
5 history
labexam@psipl-OptiPlex-SFF-7010:~$

Task-1:


labexam@psipl-OptiPlex-SFF-7010: ~/prathamesh-ese
labexam@psipl-OptiPlex-SFF-7010:~/prathamesh-ese$ sudo npm i -g ganache-cli
npm WARN deprecated ganache-cli@6.12.2: ganache-cli is now ganache; visit https://trfl.io/g7 for details
added 1 package, and audited 102 packages in 3s
2 packages are looking for funding
run `npm fund` for details
4 vulnerabilities (2 moderate, 2 high)
To address all issues, run:
npm audit fix
Run `npm audit` for details.
labexam@psipl-OptiPlex-SFF-7010:~/prathamesh-ese$ ganache-cli
Ganache CLI v6.12.2 (ganache-core: 2.13.2)
Available Accounts
==================
(0) 0xFd88086028Ba12c44a7C40BBB59067Ce1b44341E (100 ETH)
(1) 0x6C0E5d15165cDA5b3E7C8bb03451513f8dD3f85c (100 ETH)
(2) 0x5DdBFc9128Ba8E19e1DF66b5267E32fC825cd25C (100 ETH)
(3) 0xC6B2b1a8CD158585bFF30d8597fE72F5bdB19c36 (100 ETH)
(4) 0x9b5439134Ca27E84Fa822D518e77cc5420A5BA42 (100 ETH)
(5) 0x1735015e177D61262a2f76ef6F2f7ea73E288E68 (100 ETH)
(6) 0x2eEcc9FD2feBB1F0B5Cee1A48B8d3f600DAf253d (100 ETH)
(7) 0x05bC2b76526456F142ec788BAfE5f0E8DFFcA137 (100 ETH)
(8) 0xF942f82dc585d191A0488cF2c3FfF840Fa3B94F9 (100 ETH)
(9) 0x2EB3d101B0D3b90F6e8D8D92FE7644c78A293Ee8 (100 ETH)
Private Keys
==================
(0) 0x2c07c510d944a5b19c3ca5940256d7080da14b33dc1cfa1930849e74d1c2867f
(1) 0xaadf6ddf25c17d8b95fbe75ffc7dea49310e0670777cd68adba1e0c4809ad049
(2) 0x98b7e16d3e79e1acaa61f1bc705ea12ca76e876981246d2b434cbde6fe3d78e1
(3) 0xbd028d6df657ba8f24cd24f8170f4f1f1ce5d8c41ea662d2edc43fa11ed21e65
(4) 0x3ce19417b0c56a8c08eb53fd707167c201517a2b064ccbcc4ff481e462ae87fa
(5) 0x56d024b51b803f9e3015e27afe502f440509c3b9ed7a443bb5cd8bbf337f3a32
(6) 0x1ca5cdf3d8be535d81c04e34838cd2d29ae275826e63304a4394da7237f8853d
(7) 0xd8f8537f1f90fb8d9fe891c4f577e5a2e7a80e704e55c21938a5f32b6d7adda6
(8) 0x7f1ed0bc48e8ee0cc098e04e021f8b3a915dfdc803d918184344f6993d6d75bc
(9) 0x987483793c20c5363cf88715b193a1ec26d645ac06f5848e7fa0dd3d32400056
HD Wallet
==================
Mnemonic: coin grass scan cute swear celery add bundle produce bulk other thrive


OEIT1-BCT 2023-2024 (Ev
Prathamesh Mundada - L
The Ultimate Crypto Wall
MetaMask
metamask.io
Relaunch to update
Discover MetaMask Portfolio today. Track and manage your web3 assets in one place! →
METAMASK
Features
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Resources
Learn
Download
A crypto wallet & gateway to blockchain apps
Start exploring blockchain applications in seconds. Trusted by over 100 million users worldwide.
Download for
0.1221 ETH
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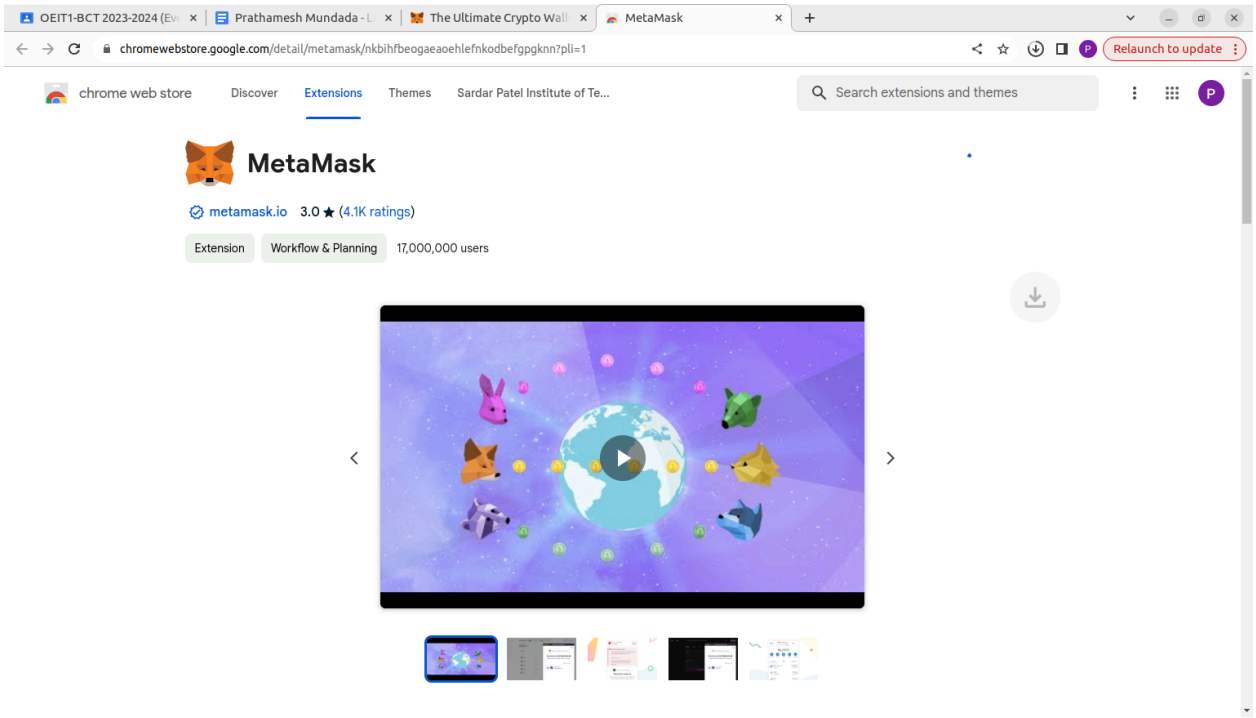
OEIT1-BCT 2023-2024 (Ev
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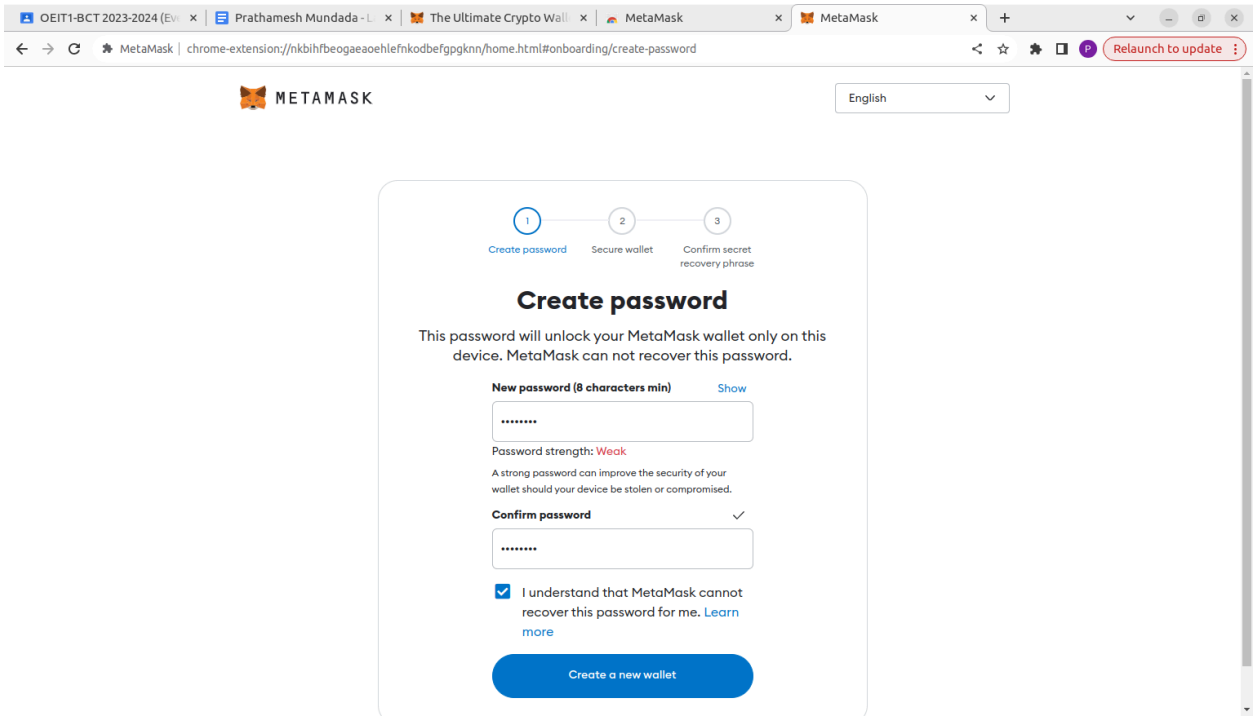
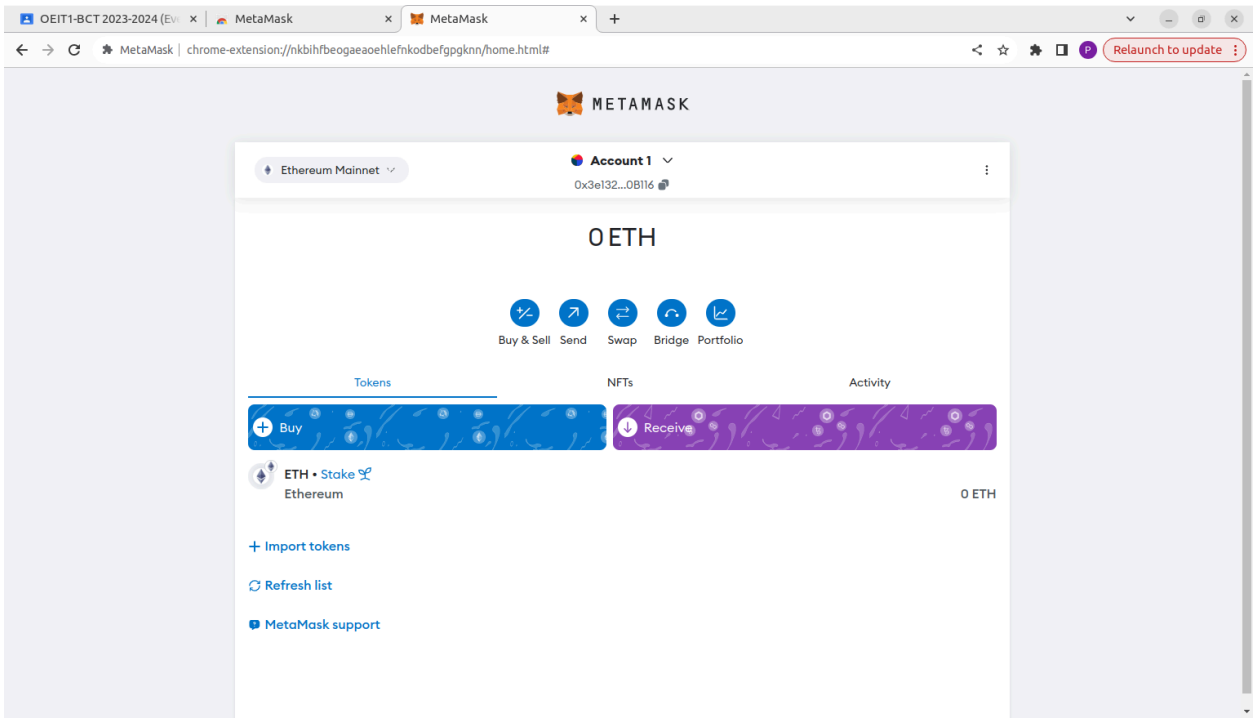
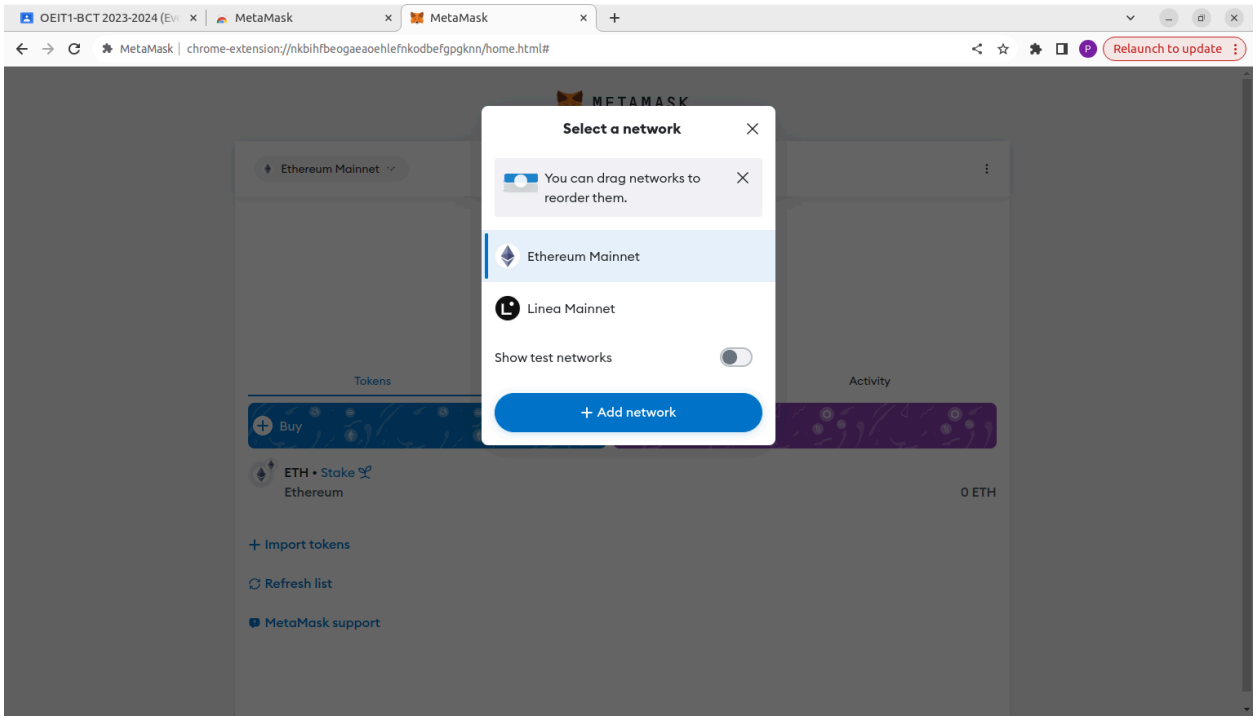
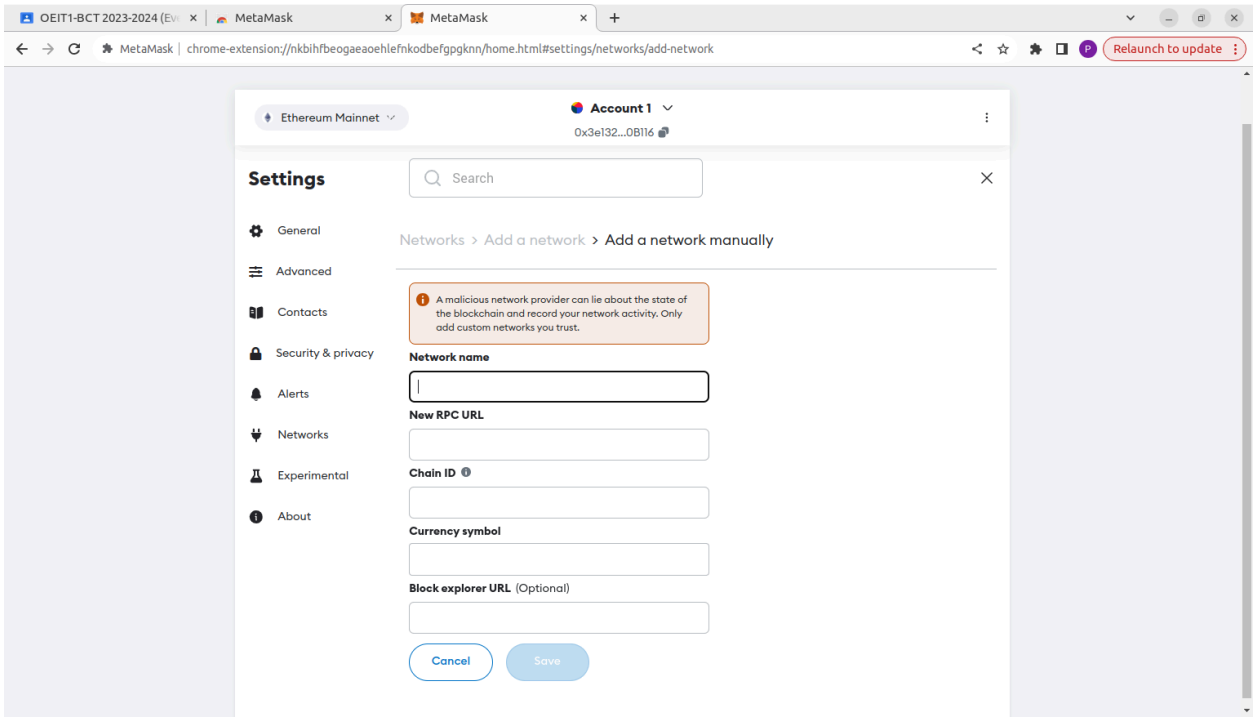
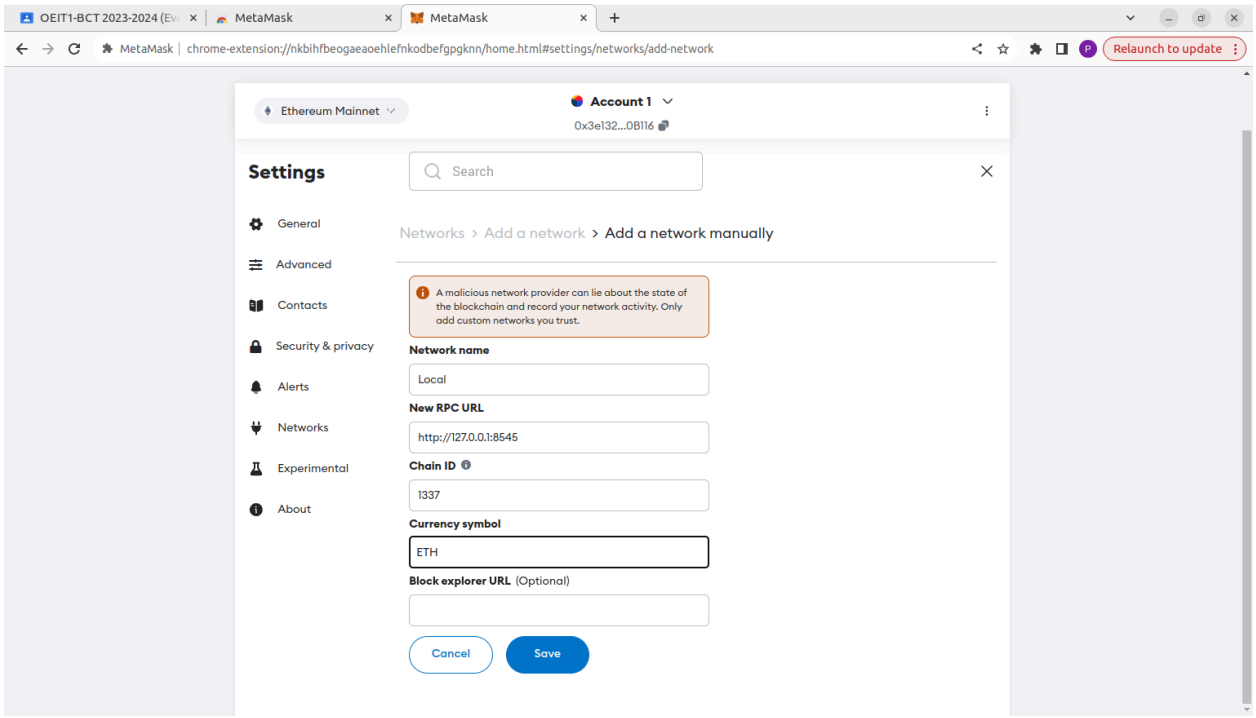
The Ultimate Crypto Wall
MetaMask
chromewebstore.google.com/detail/metamask/nkbihfbeogaeaoehlefnkodbefgpgknn?pli=1
Relaunch to update
chrome web store
Discover
Extensions
Themes
Sardar Patel Institute of Te...
Search extensions and themes
MetaMask
metamask.io 3.0 ★ (4.1K ratings)
Extension
Workflow & Planning
17,000,000 users

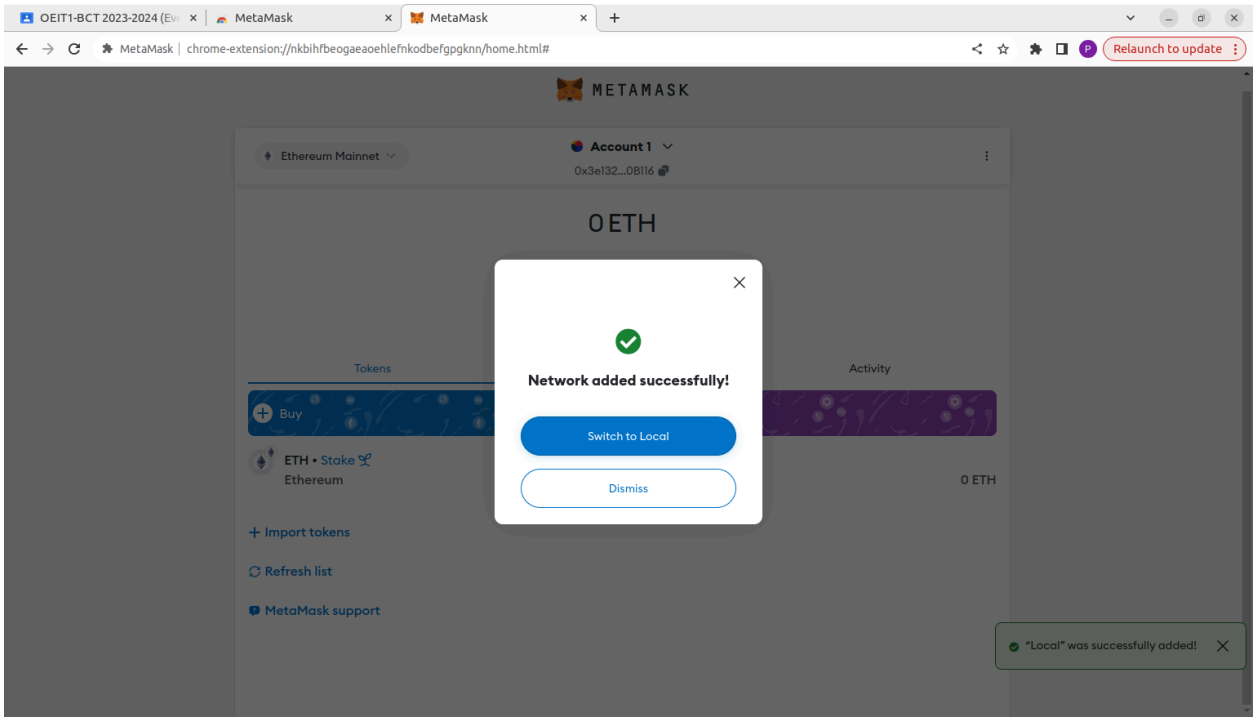

OEIT1-BCT 2023-2024 (Ev
Prathamesh Mundada - L
The Ultimate Crypto Wall
MetaMask
MetaMask
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#onboarding/create-password
Relaunch to update
METAMASK
English
1
Create password
2
Secure wallet
3
Confirm secret recovery phrase
Create password
This password will unlock your MetaMask wallet only on this device. MetaMask can not recover this password.
New password (8 characters min)
Show
Password strength: Weak
A strong password can improve the security of your wallet should your device be stolen or compromised.
Confirm password
I understand that MetaMask cannot recover this password for me. Learn more
Create a new wallet

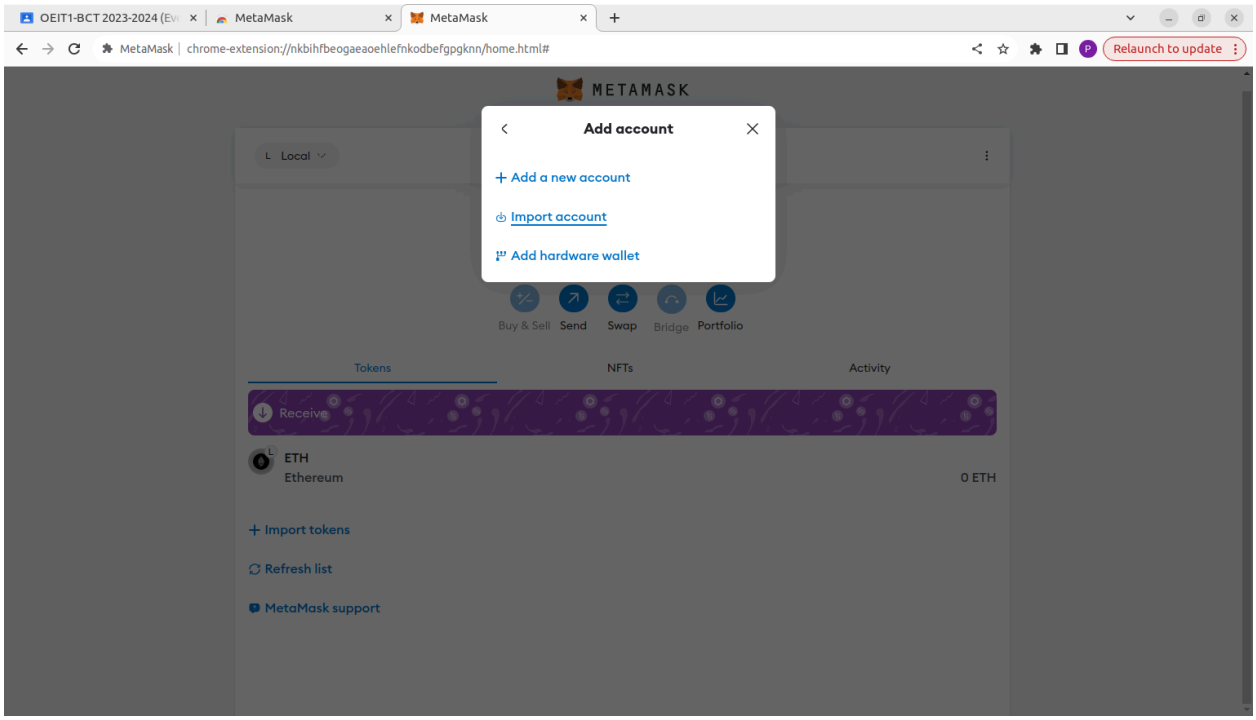

OEIT1-BCT 2023-2024 (Ev
MetaMask
MetaMask
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#
Relaunch to update
METAMASK
Ethereum Mainnet
Account 1
0x3e132...0B116
0 ETH
Buy & Sell
Send
Swap
Bridge
Portfolio
Tokens
NFTs
Activity
Buy
Receive
ETH • Stake
Ethereum
0 ETH
Import tokens
Refresh list
MetaMask support


OEIT1-BCT 2023-2024 (Ev
MetaMask
MetaMask
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#
Relaunch to update
METAMASK
Ethereum Mainnet
Select a network
You can drag networks to reorder them.
Ethereum Mainnet
Linea Mainnet
Show test networks
+ Add network
Tokens
Activity
Buy
ETH • Stake
Ethereum
0 ETH
+ Import tokens
Refresh list
MetaMask support

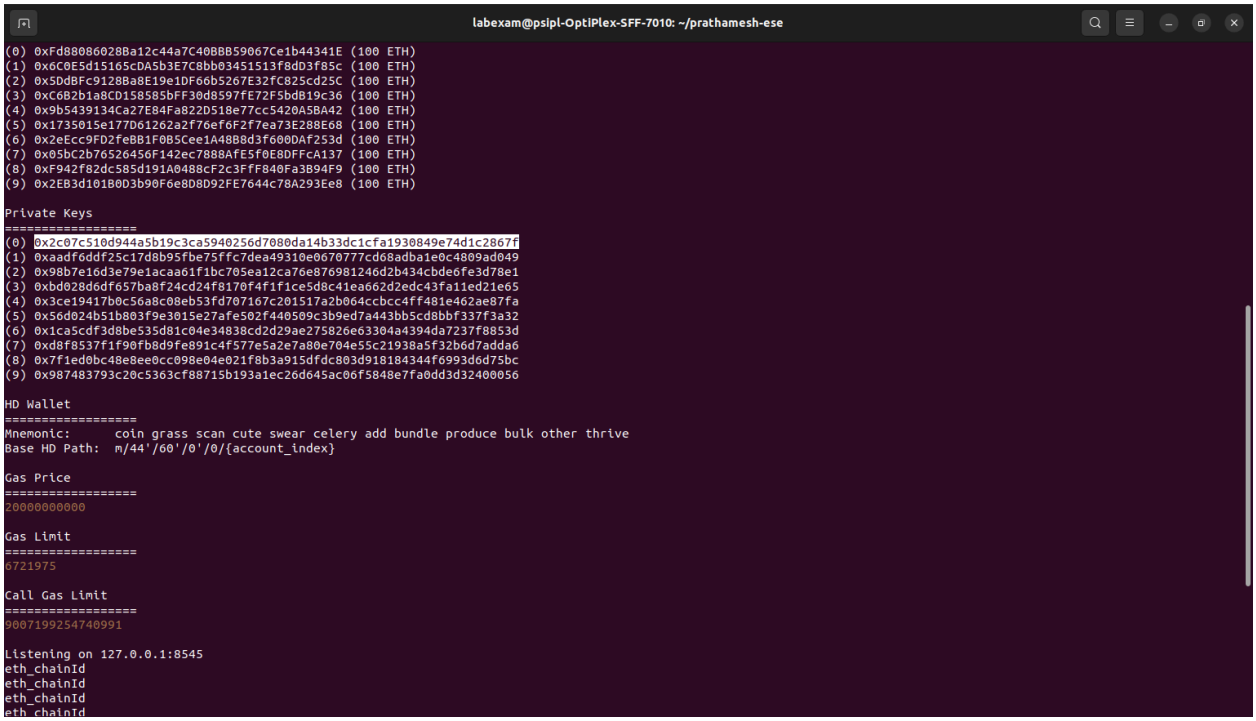

OEIT1-BCT 2023-2024 (Ev
MetaMask
MetaMask
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#settings/networks/add-network
Relaunch to update
Ethereum Mainnet
Account 1
0x3e132...0B116
Settings
Search
General
Advanced
Contacts
Security & privacy
Alerts
Networks
Experimental
About
Networks > Add a network > Add a network manually
A malicious network provider can lie about the state of the blockchain and record your network activity. Only add custom networks you trust.
Network name
New RPC URL
Chain ID
Currency symbol
Block explorer URL (Optional)
Cancel
Save

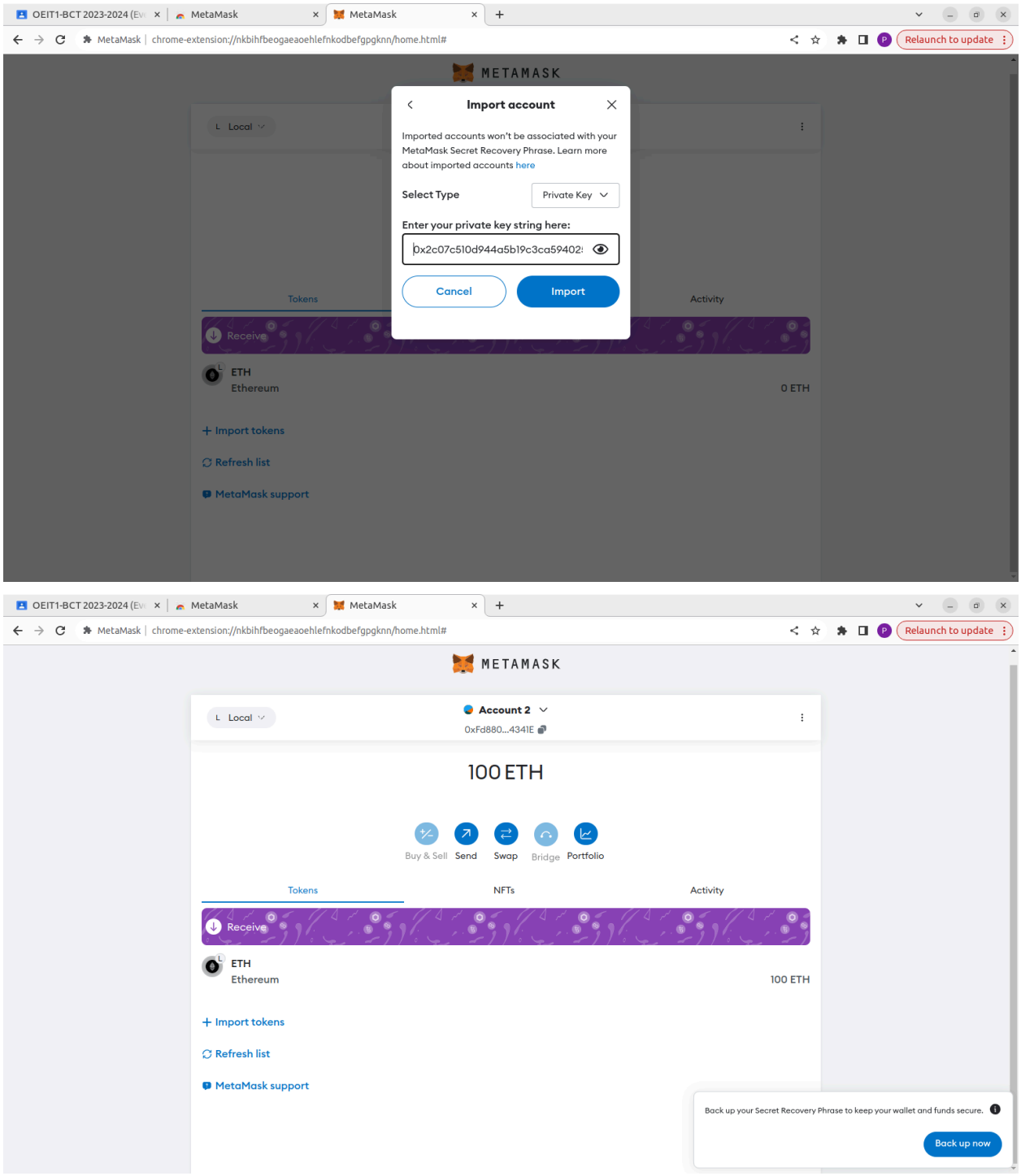

OEIT1-BCT 2023-2024 (Ev
MetaMask
MetaMask
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#settings/networks/add-network
Relaunch to update
Ethereum Mainnet
Account 1
0x3e132...0B116
Settings
Search
General
Advanced
Contacts
Security & privacy
Alerts
Networks
Experimental
About
Networks > Add a network > Add a network manually
A malicious network provider can lie about the state of the blockchain and record your network activity. Only add custom networks you trust.
Network name
Local
New RPC URL
http://127.0.0.1:8545
Chain ID
1337
Currency symbol
ETH
Block explorer URL (Optional)
Cancel
Save


OEIT1-BCT 2023-2024 (Ev
MetaMask
MetaMask
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#
Relaunch to update
METAMASK
Ethereum Mainnet
Account 1
0x3e132...0B116
0 ETH
Network added successfully!
Switch to Local
Dismiss
Tokens
Activity
Buy
ETH • Stake
Ethereum
0 ETH
Import tokens
Refresh list
MetaMask support
"Local" was successfully added!



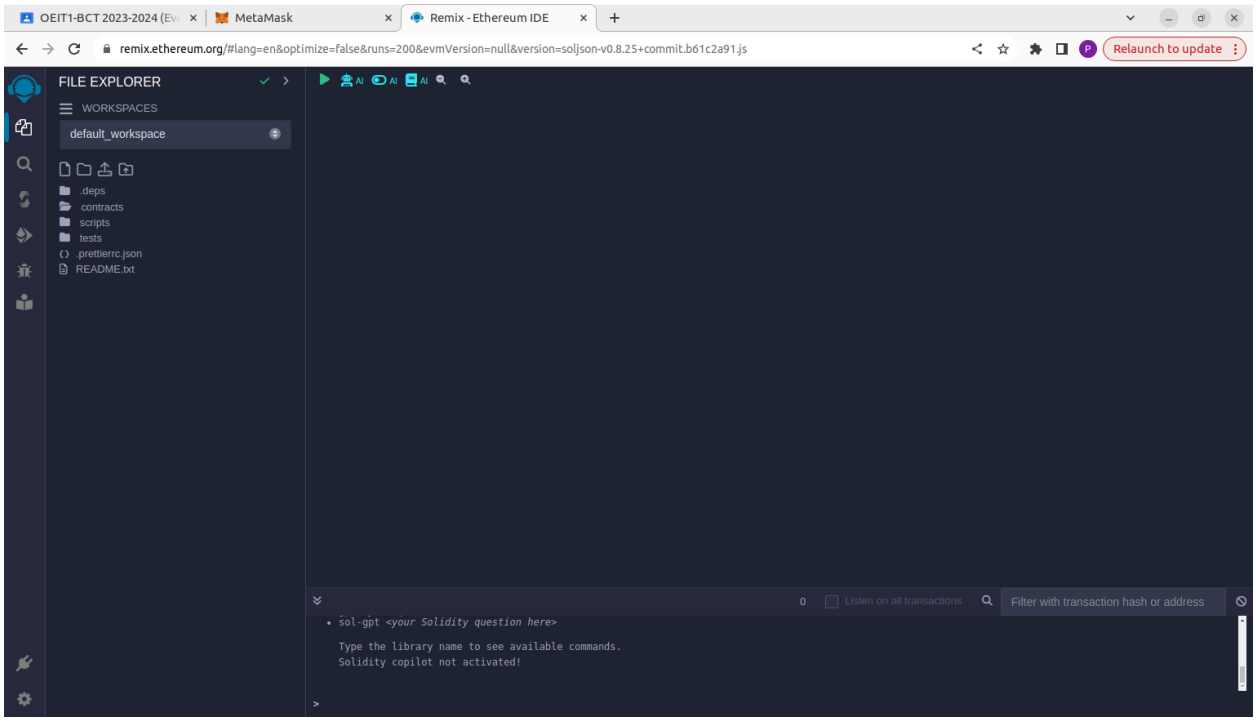

Setup metamask

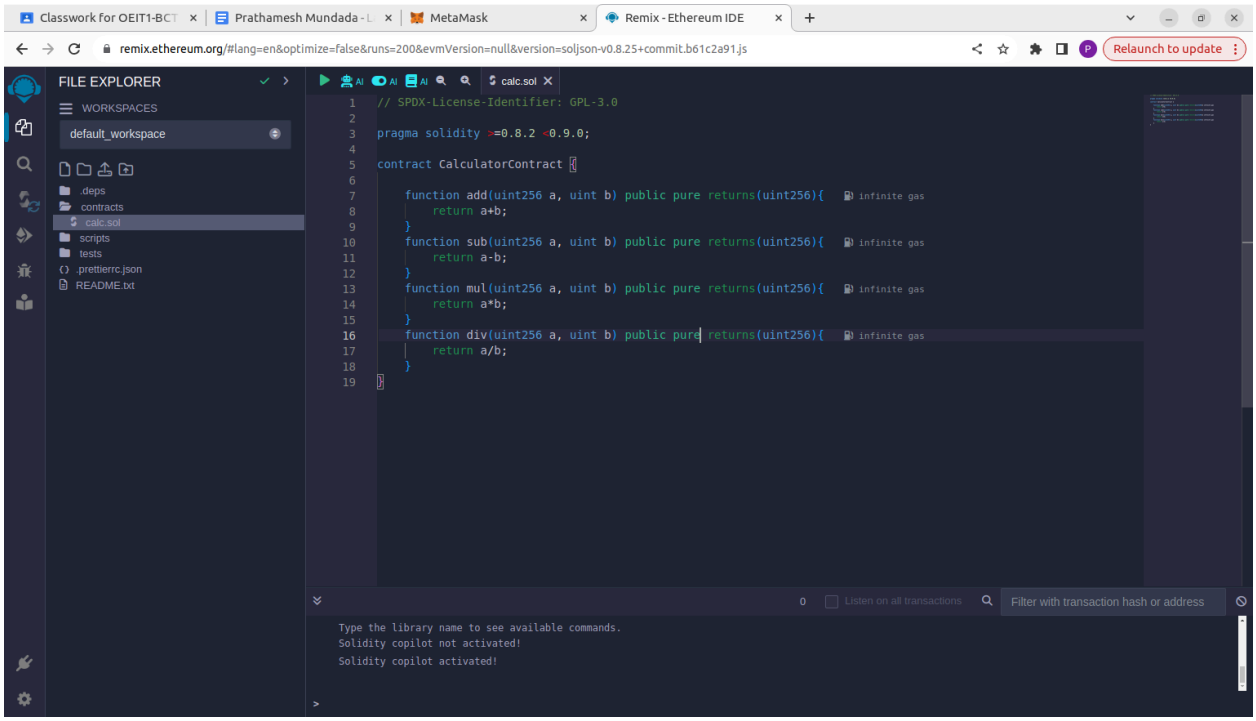




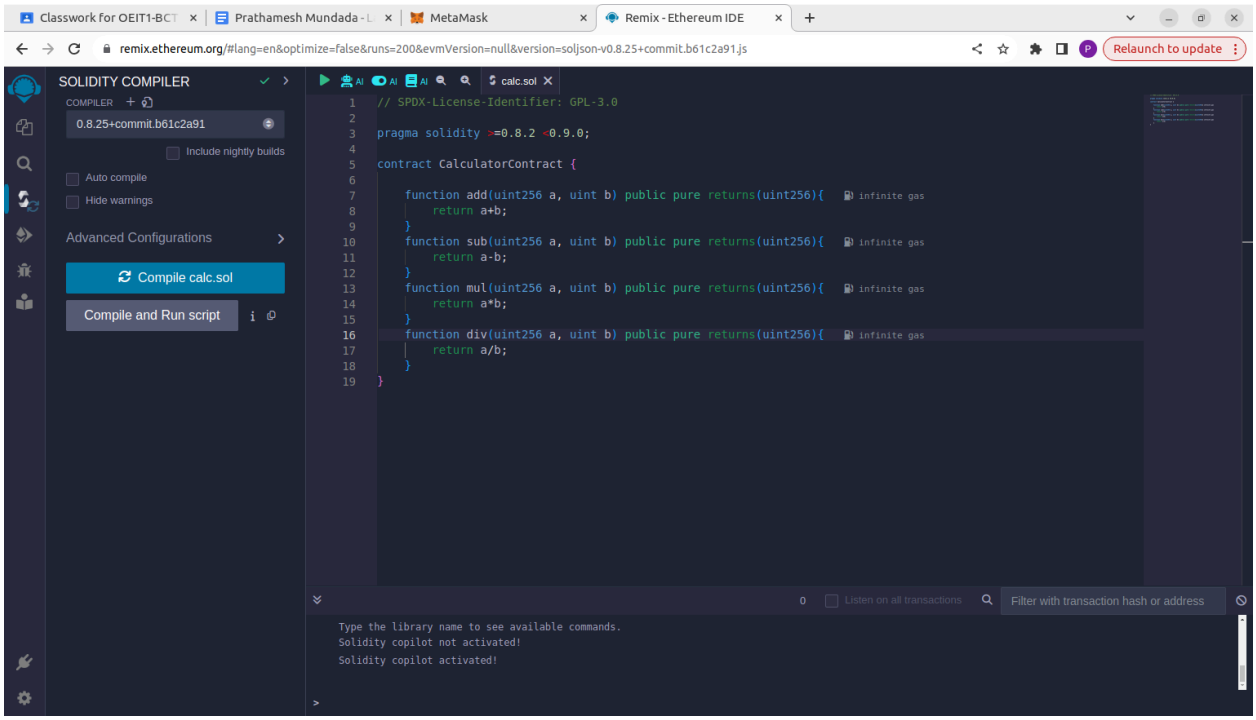

Importing account

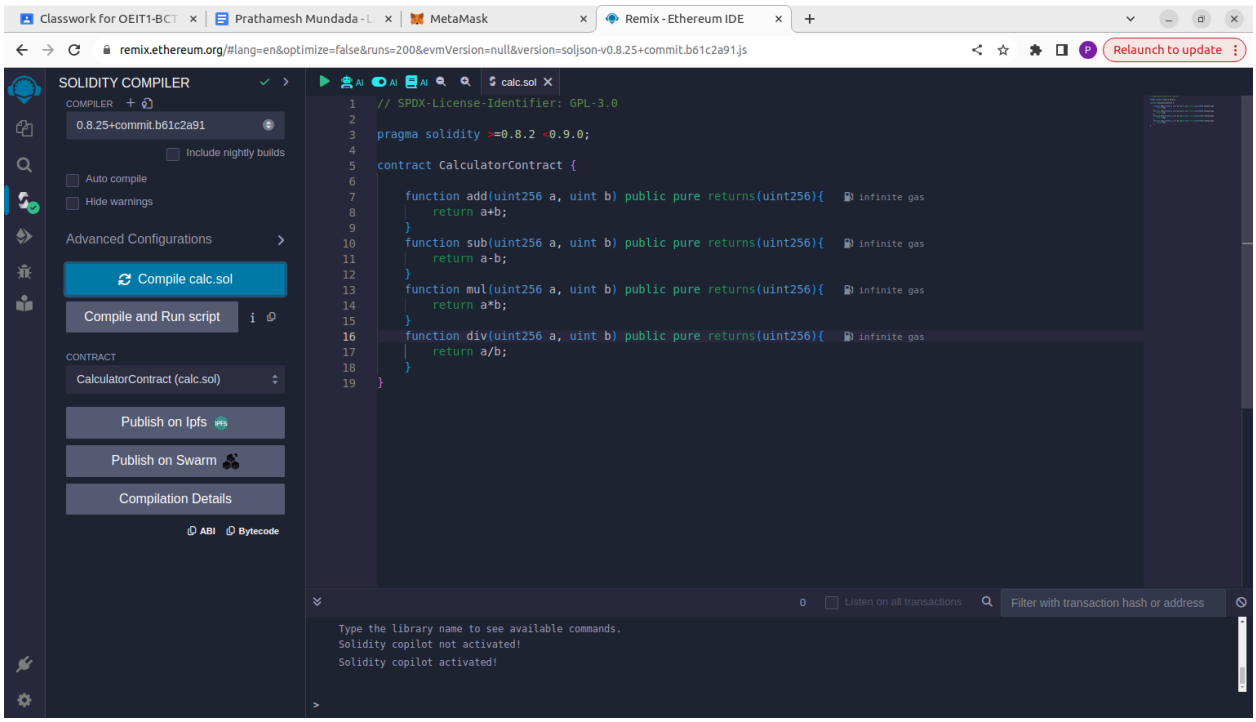
Task-2:



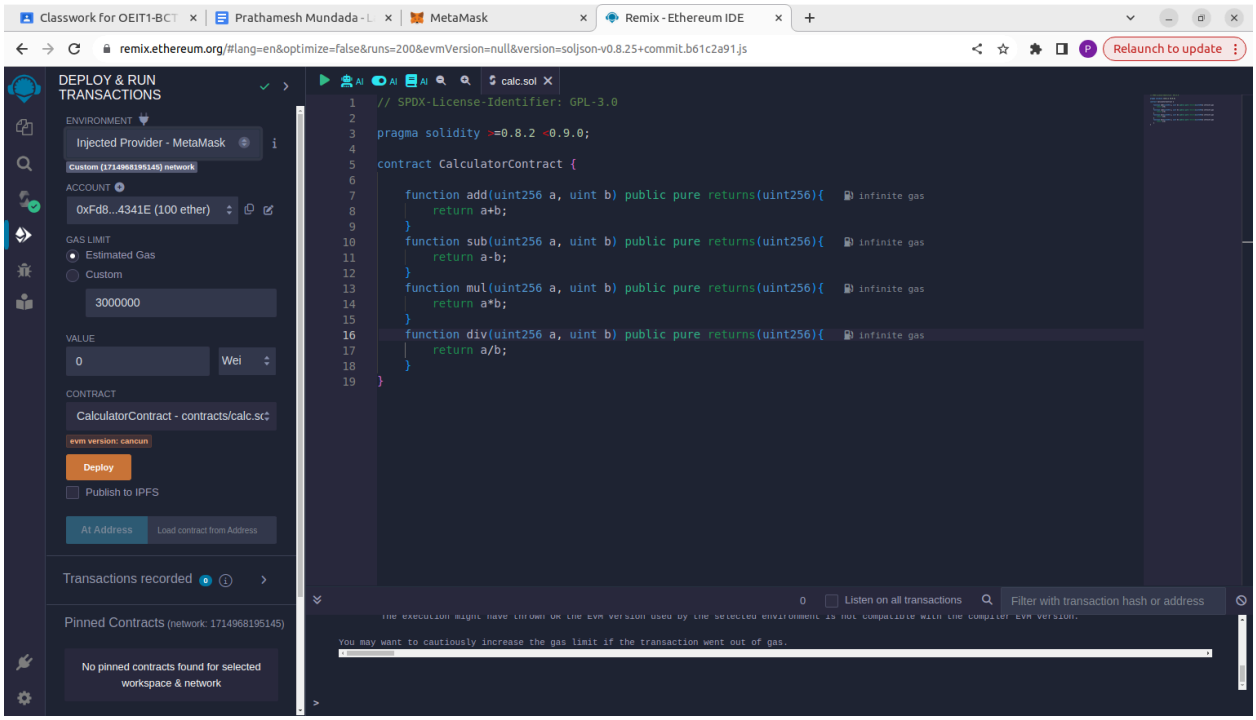




Created the contract

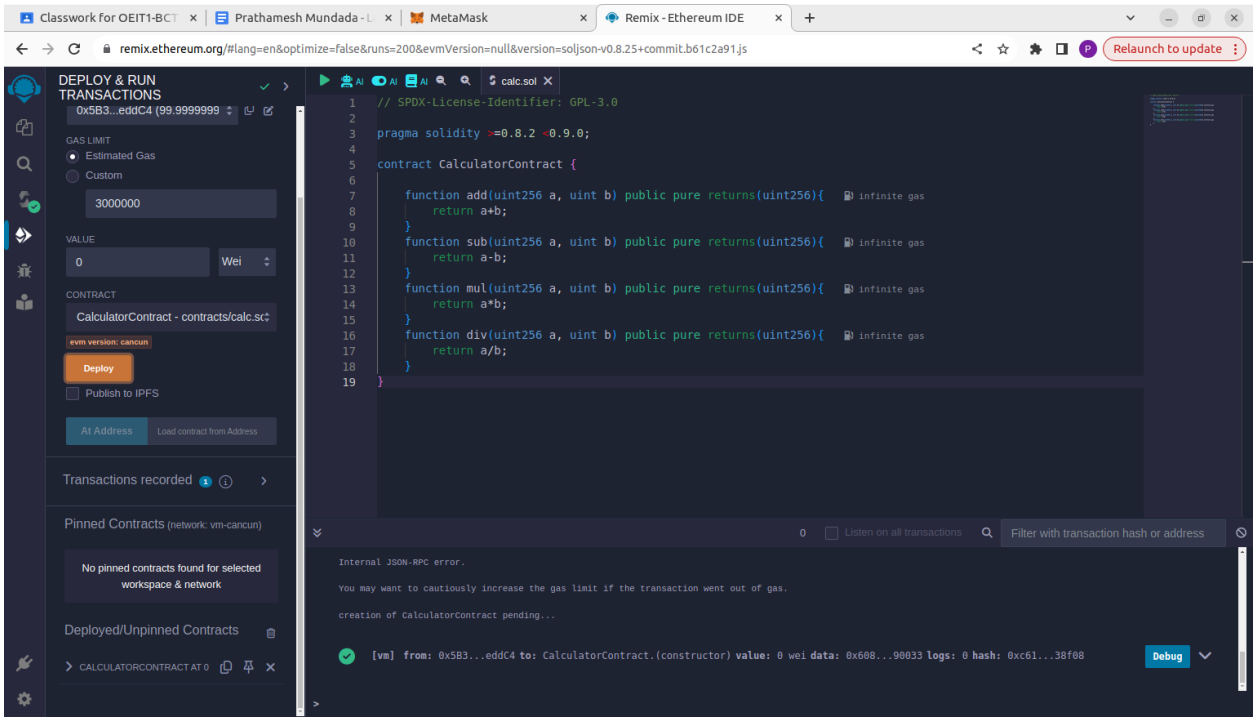


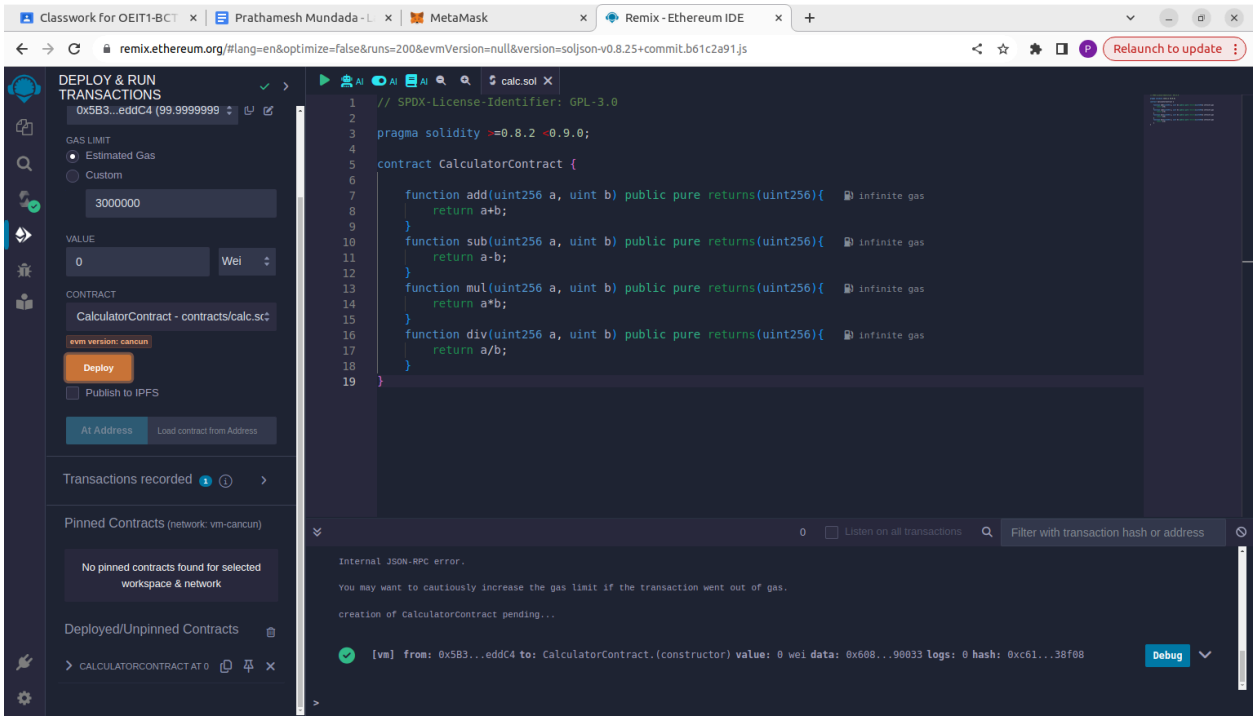




Compiled the contract

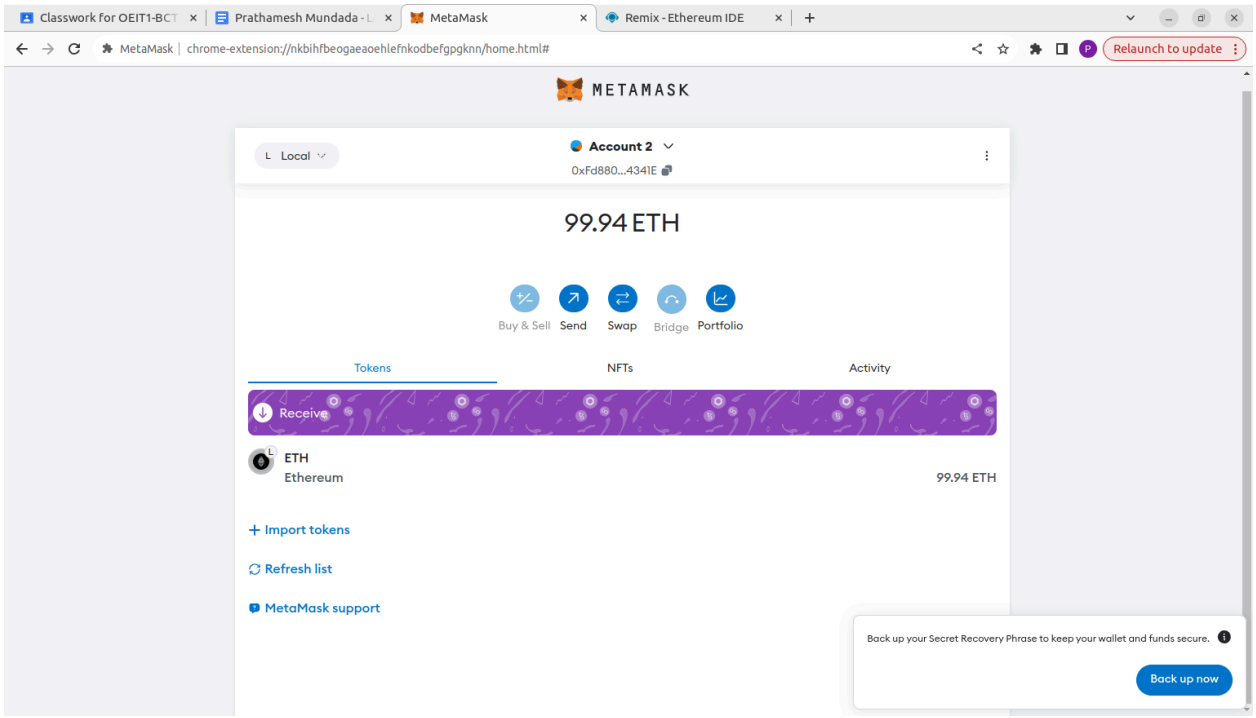


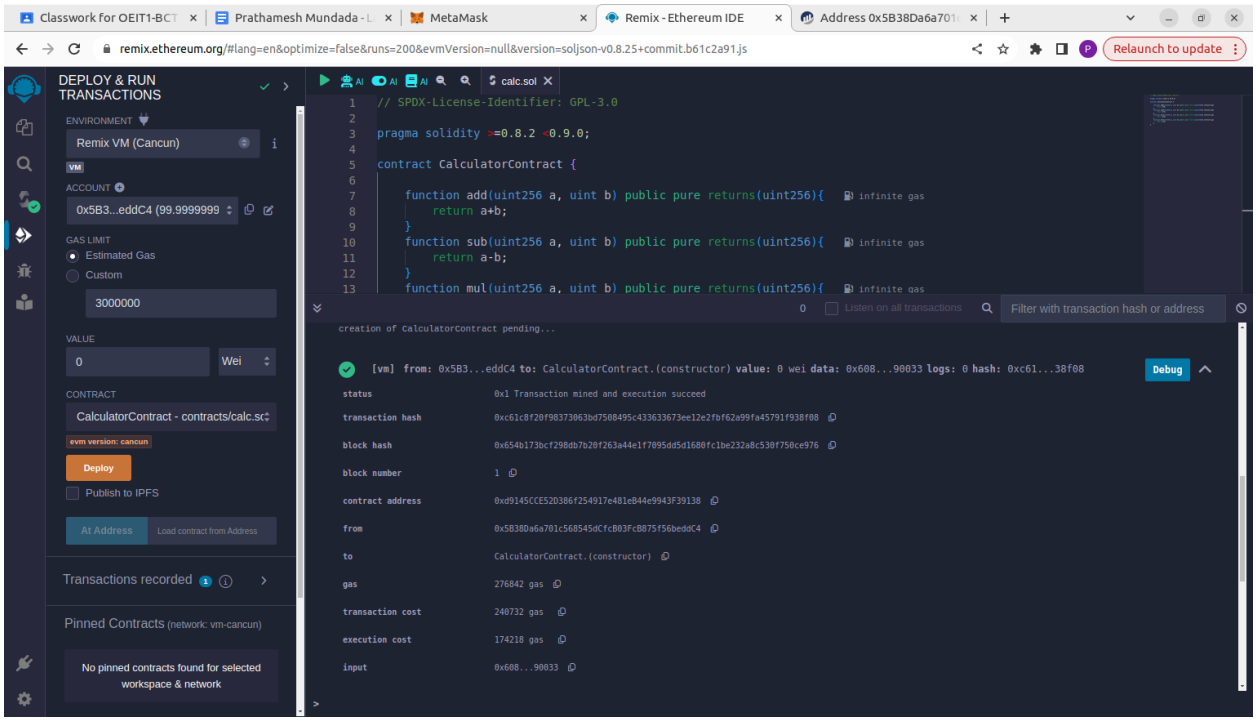

Changed provider

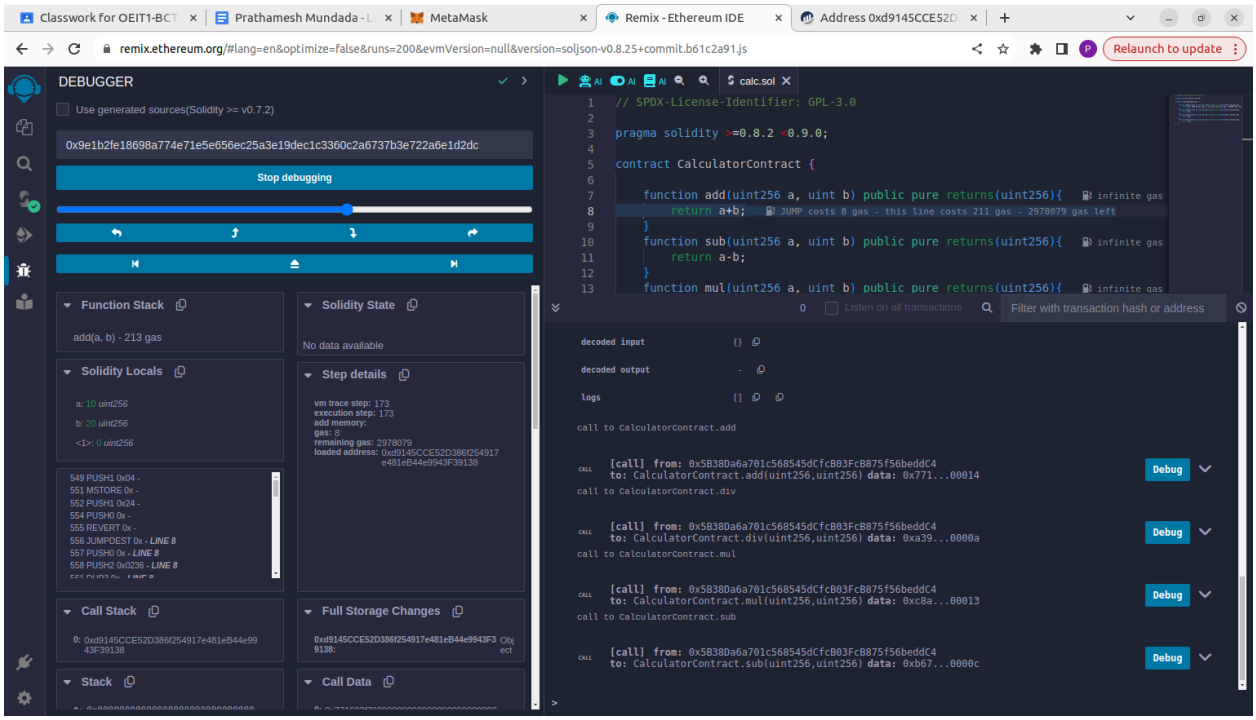




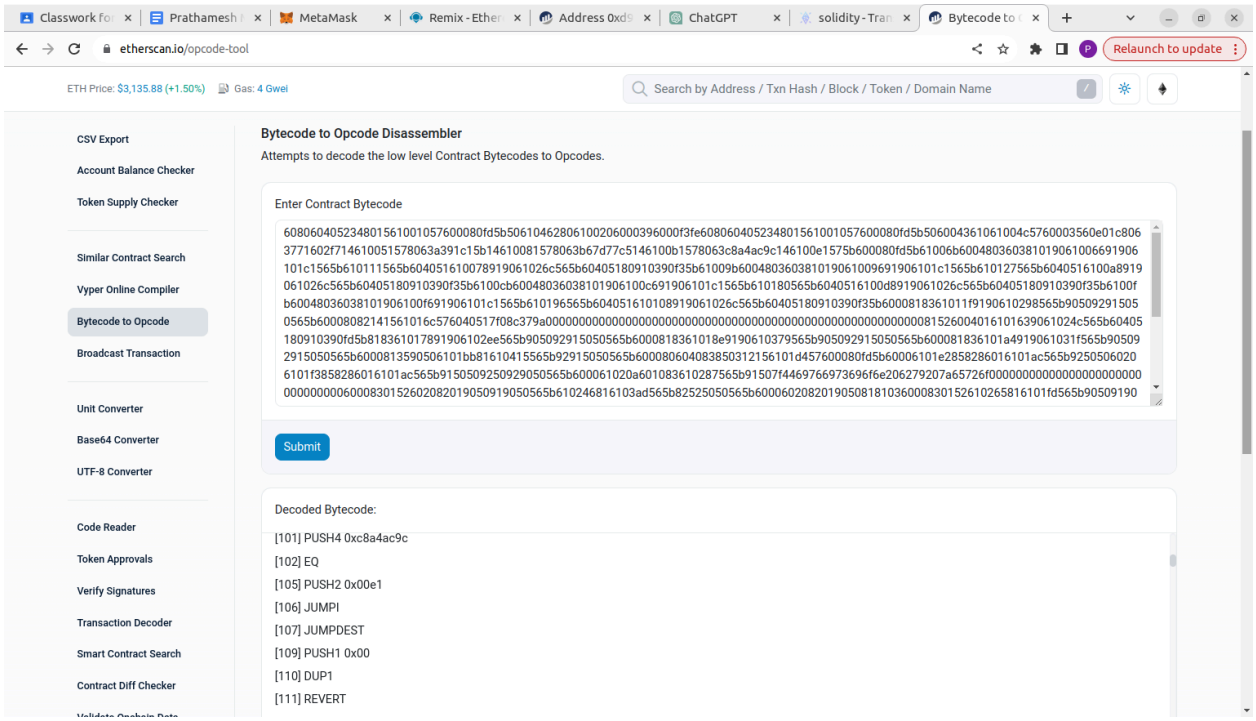

Deployed the contract


Classwork for OEIT1-BCT
Prathamesh Mundada - L
MetaMask
Remix - Ethereum IDE
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#
Relaunch to update
METAMASK
Local
Account 2
0xFd880...4341E
99.94 ETH
Buy & Sell
Send
Swap
Bridge
Portfolio
Tokens
NFTs
Activity
Receive
ETH
Ethereum
99.94 ETH
Import tokens
Refresh list
MetaMask support
Back up your Secret Recovery Phrase to keep your wallet and funds secure.
Back up now


Classwork for OEIT1-BCT
Prathamesh Mundada - L
MetaMask
Remix - Ethereum IDE
Address 0x5B38Da6a701
remix.ethereum.org/#lang=en&optimize=false&runs=200&evmVersion=null&version=soljson-v0.8.25+commit.b61c2a91.js
Relaunch to update
DEPLOY & RUN TRANSACTIONS
ENVIRONMENT
Remix VM (Cancun)
ACCOUNT
0x5B3...eddC4 (99.9999999
GAS LIMIT
Estimated Gas
Custom
3000000
VALUE
0
Wei
CONTRACT
CalculatorContract - contracts/calc.sc
evm version: cancun
Deploy
Publish to IPFS
At Address
Load contract from Address
Transactions recorded
Pinned Contracts (network: vm-cancun)
No pinned contracts found for selected workspace & network
calc.sol
// SPDX-License-Identifier: GPL-3.0
pragma solidity >=0.8.2 <0.9.0;
contract CalculatorContract {
function add(uint256 a, uint b) public pure returns(uint256){
return a+b;
}
function sub(uint256 a, uint b) public pure returns(uint256){
return a-b;
}
function mul(uint256 a, uint b) public pure returns(uint256){
infinite gas
Filter with transaction hash or address
creation of CalculatorContract pending...
[vm] from: 0x5B3...eddC4 to: CalculatorContract.(constructor) value: 0 wei data: 0x608...90033 logs: 0 hash: 0xc61...38f08
Debug
status
0x1 Transaction mined and execution succeed
transaction hash
0xc61c8f20f98373063bd7508495c43363673ee12e2fbf62a99fa45791f938f08
block hash
0x654b173bcf298db7b20f263a44e1f7095dd5d1680fc1be232a8c530f750ce976
block number
1
contract address
0xd9145CCE52D386f254917e481eB44e9943F39138
from
0x5B38Da6a701c568545dCfcB03FcB875f56beddC4
to
CalculatorContract.(constructor)
gas
276842 gas
transaction cost
240732 gas
execution cost
174218 gas
input
0x608...90033

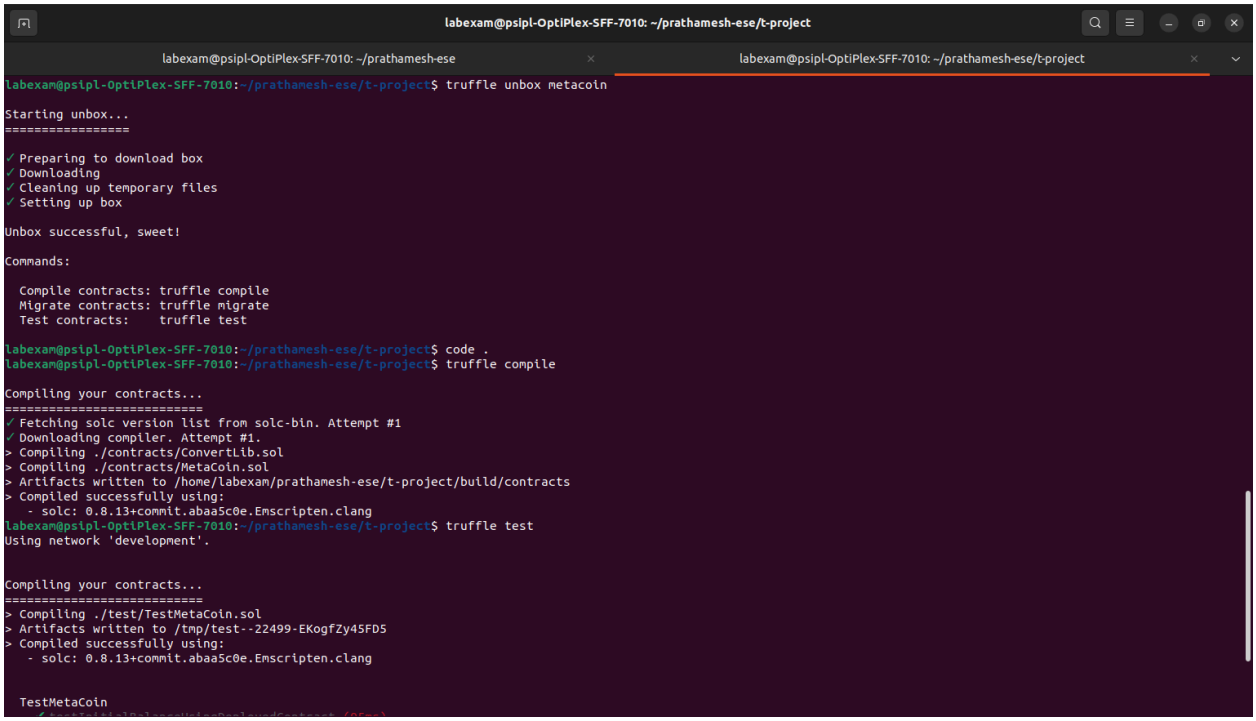



debugging

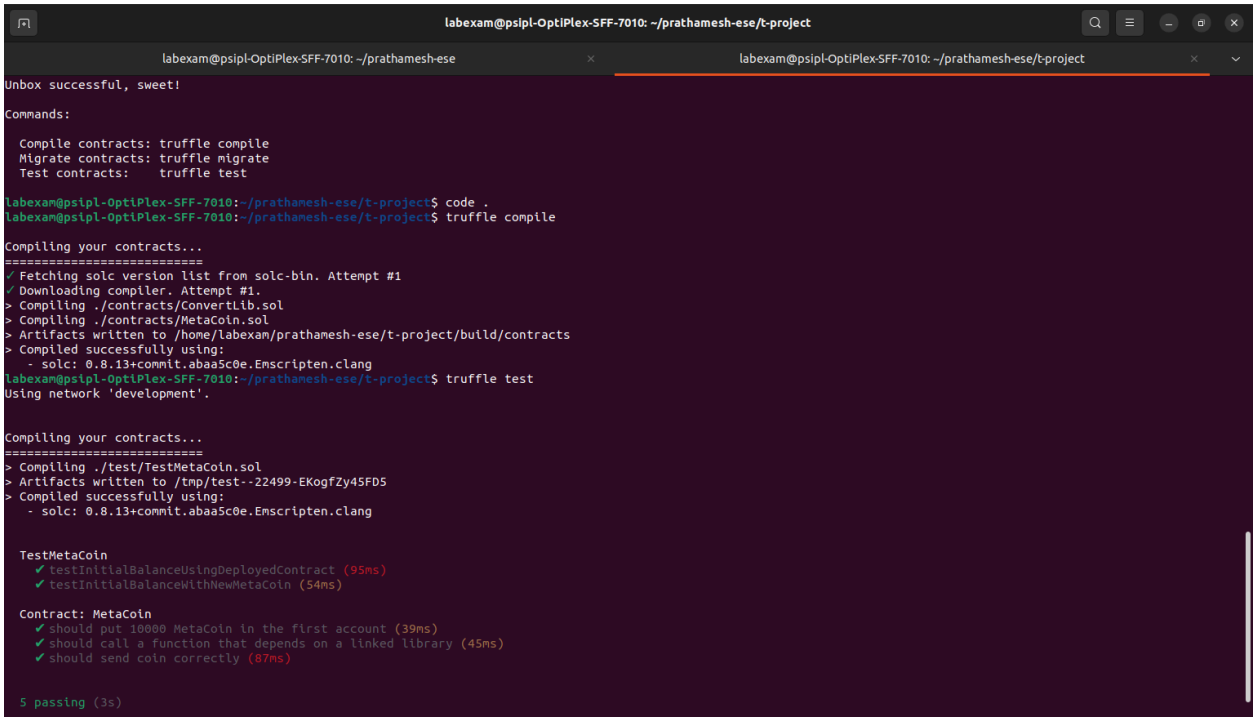



Decoded byte code

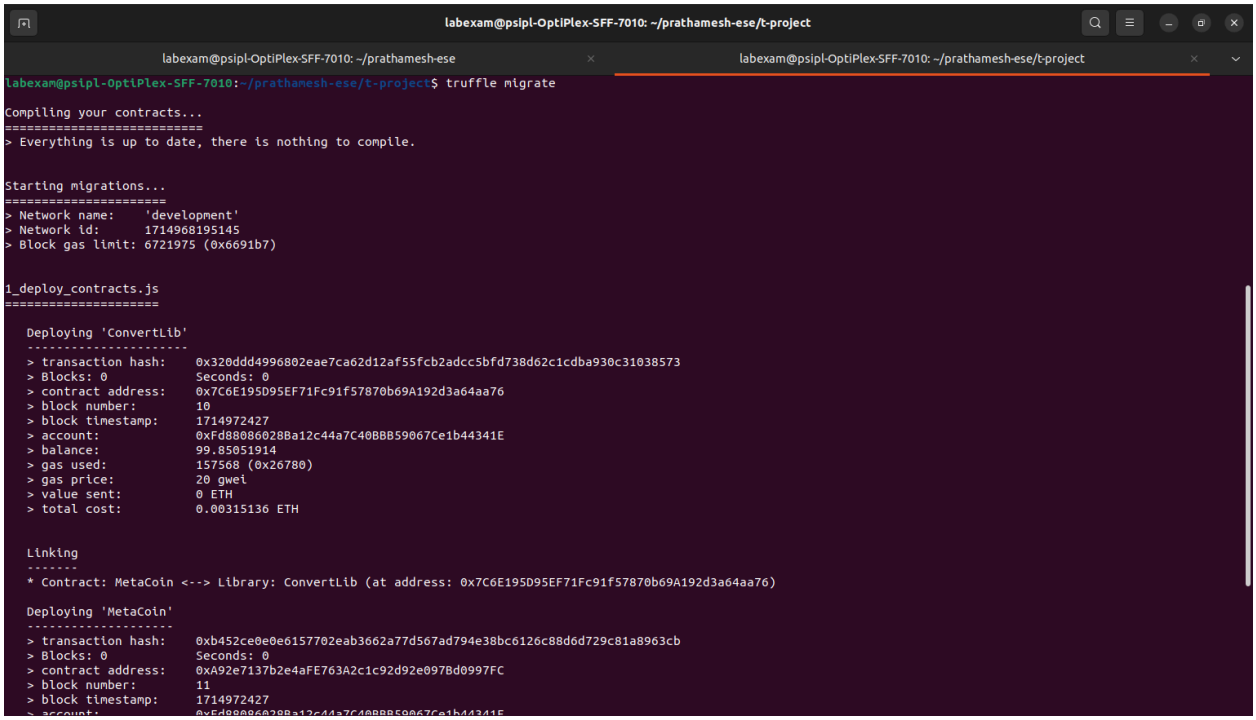
Task-3:

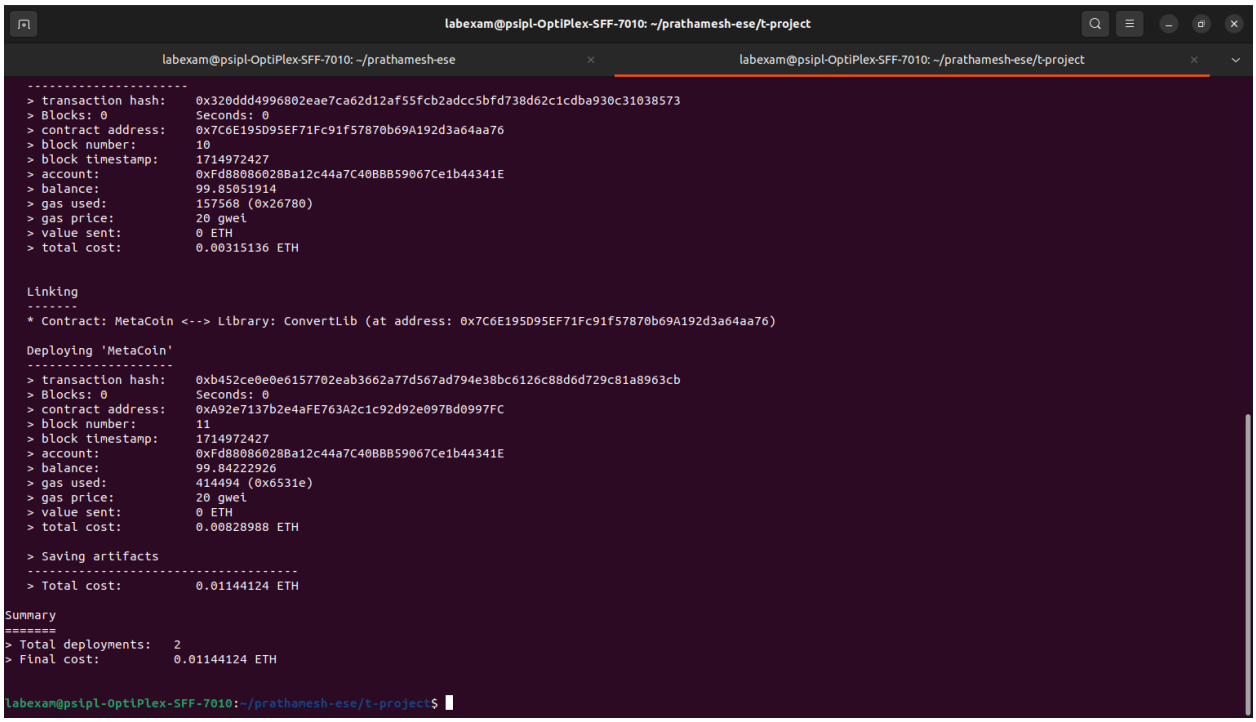



Installed truffle and unboxed/created a new existing metacoin dir

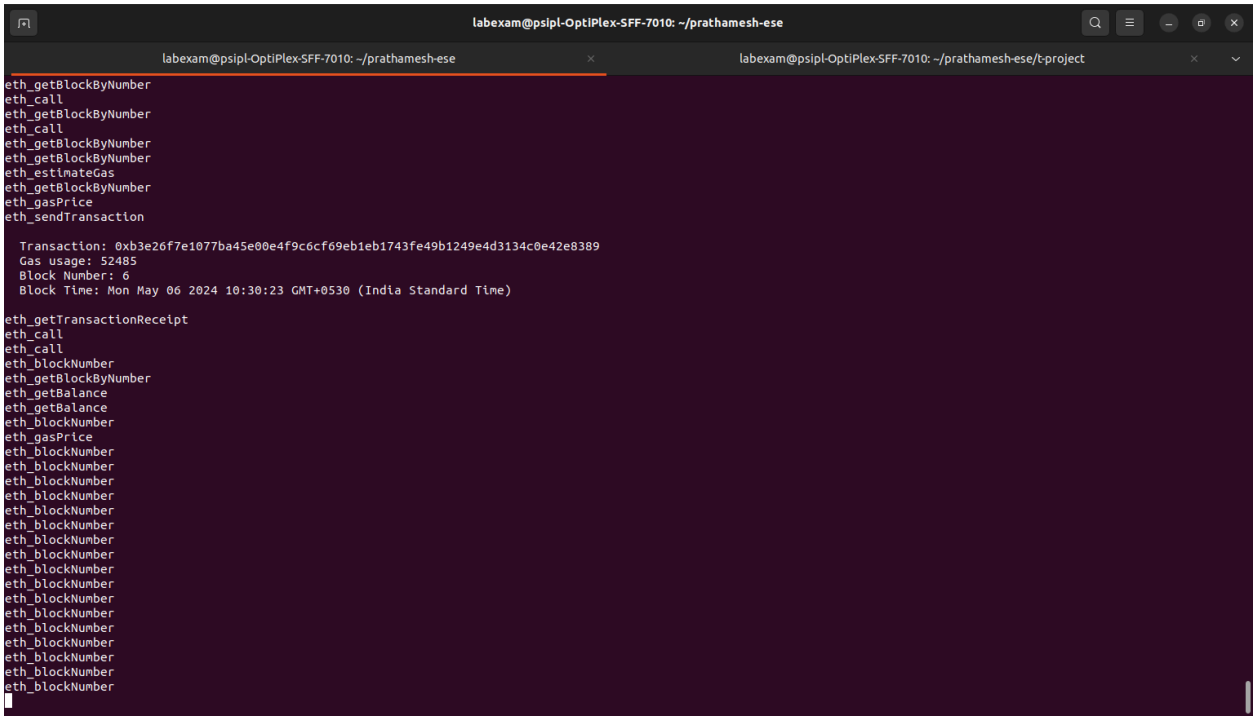



Compiled and test



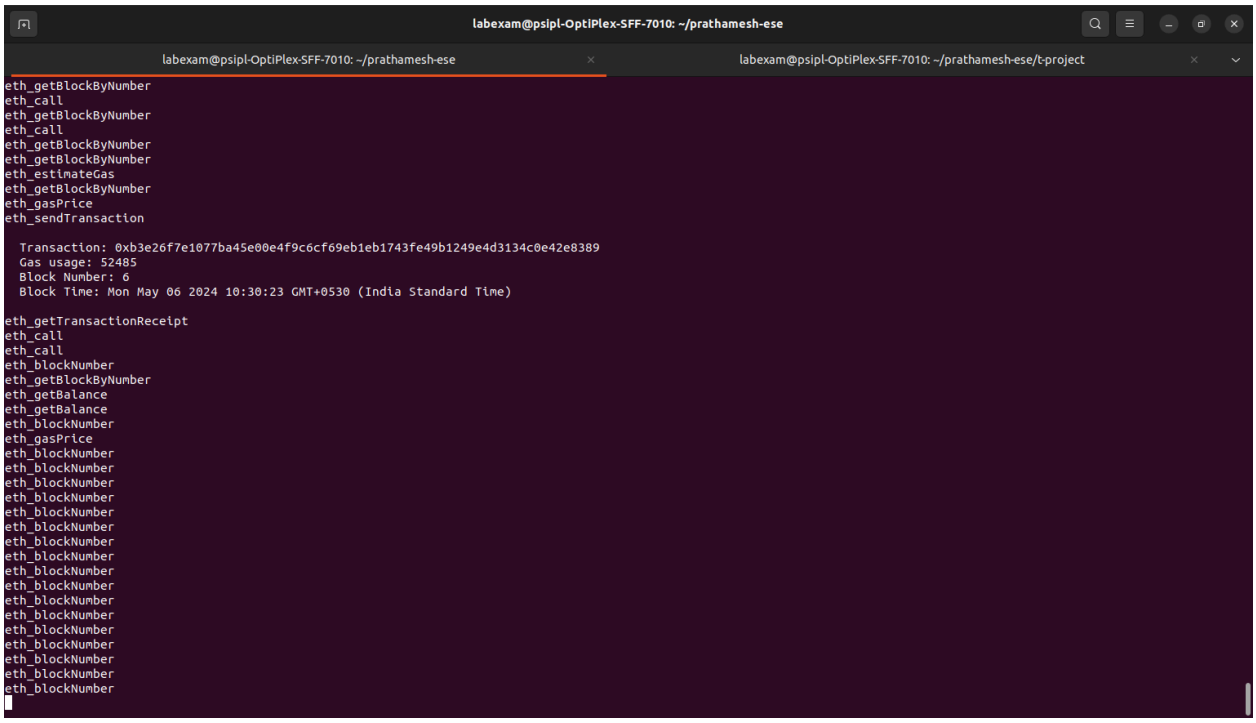




Deployed the contract.

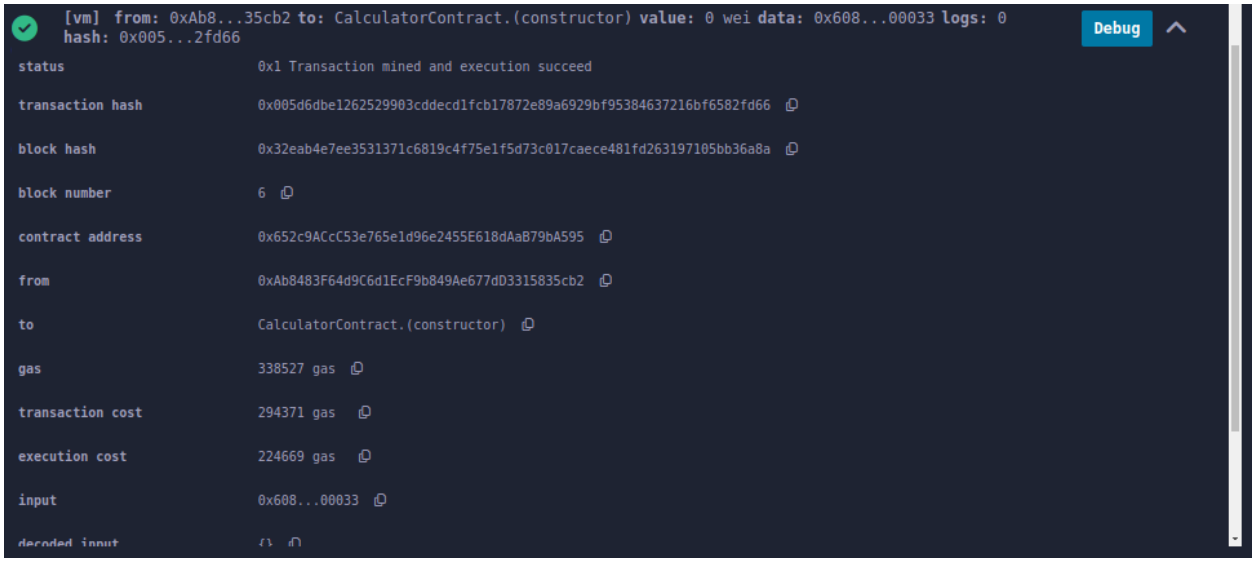



Crosschecked the transaction deployment on ganache logs

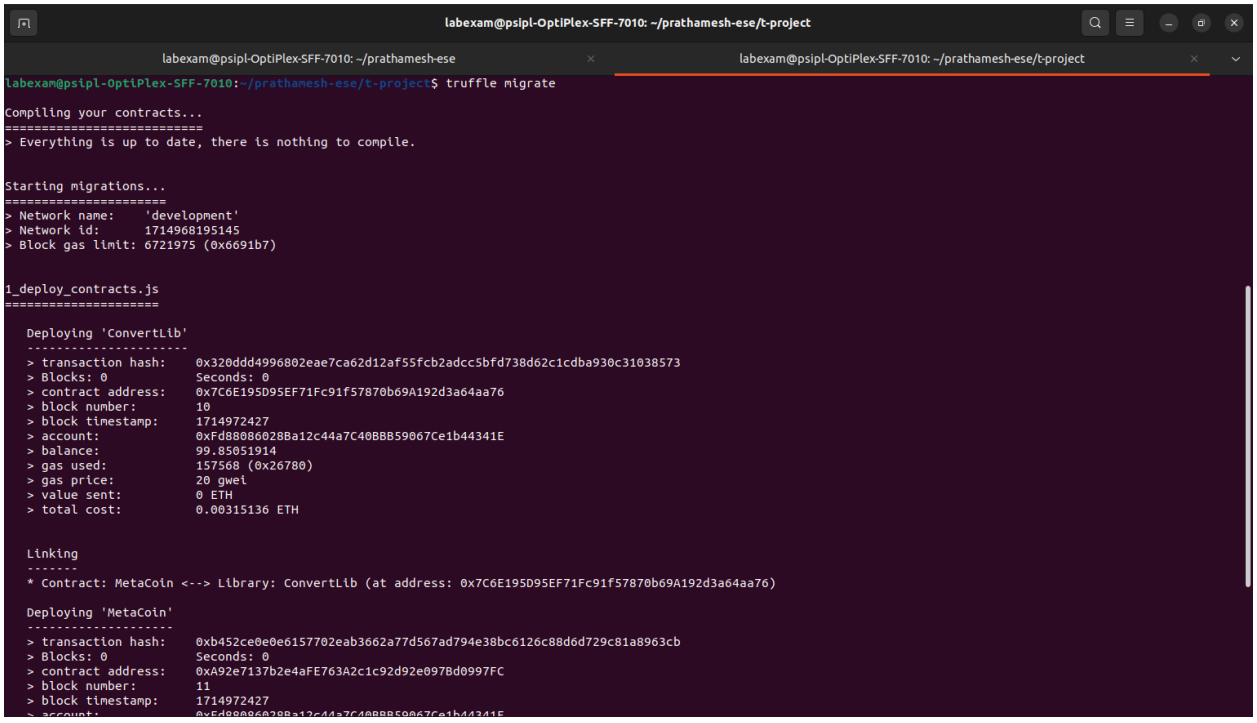
Task-4:

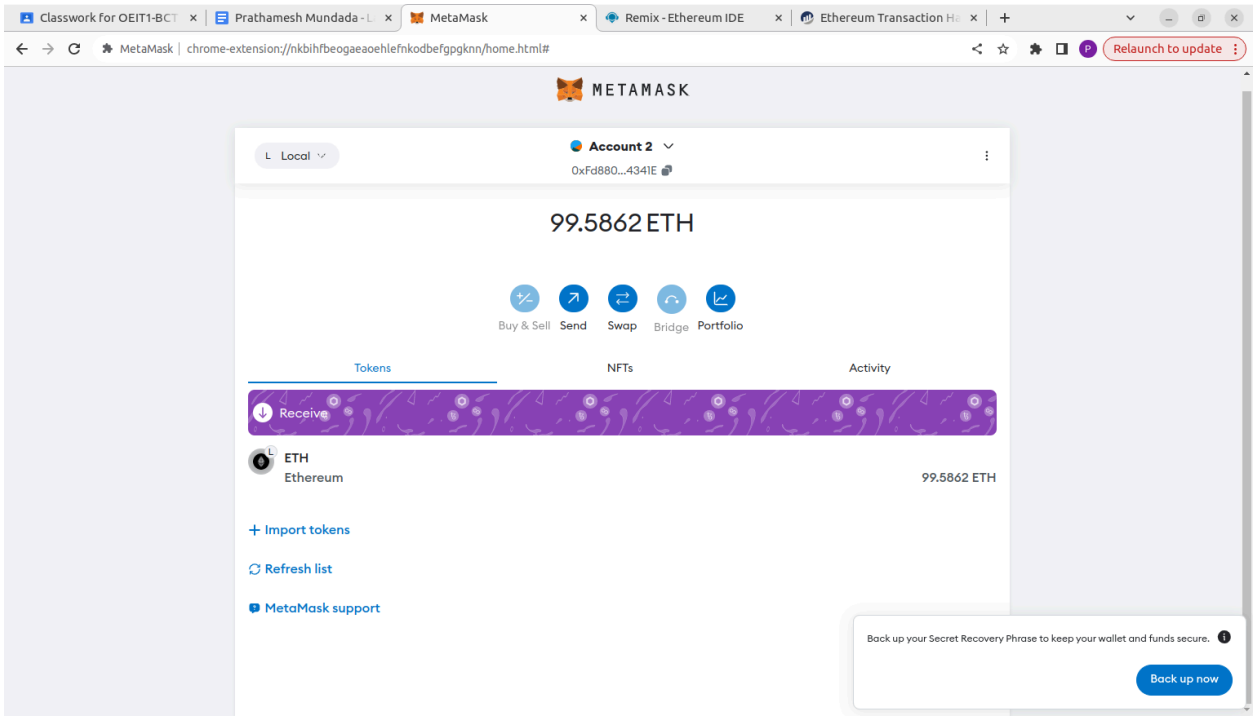



Gas used here is 52485

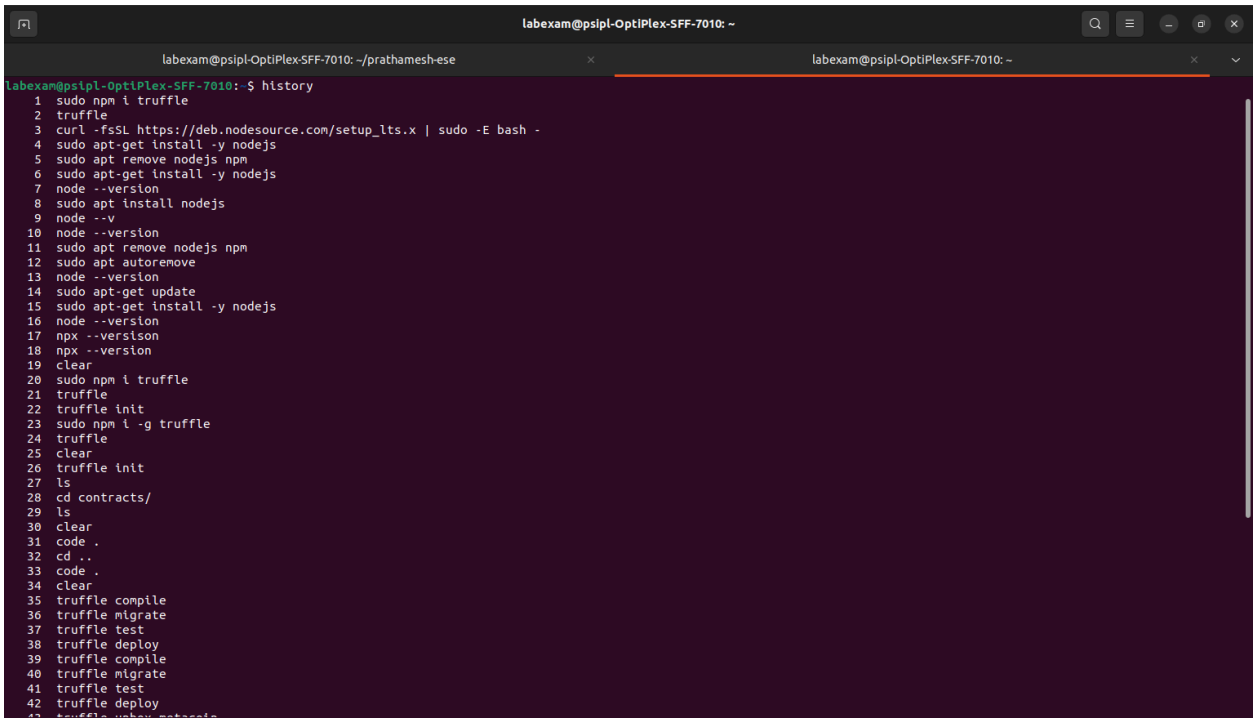


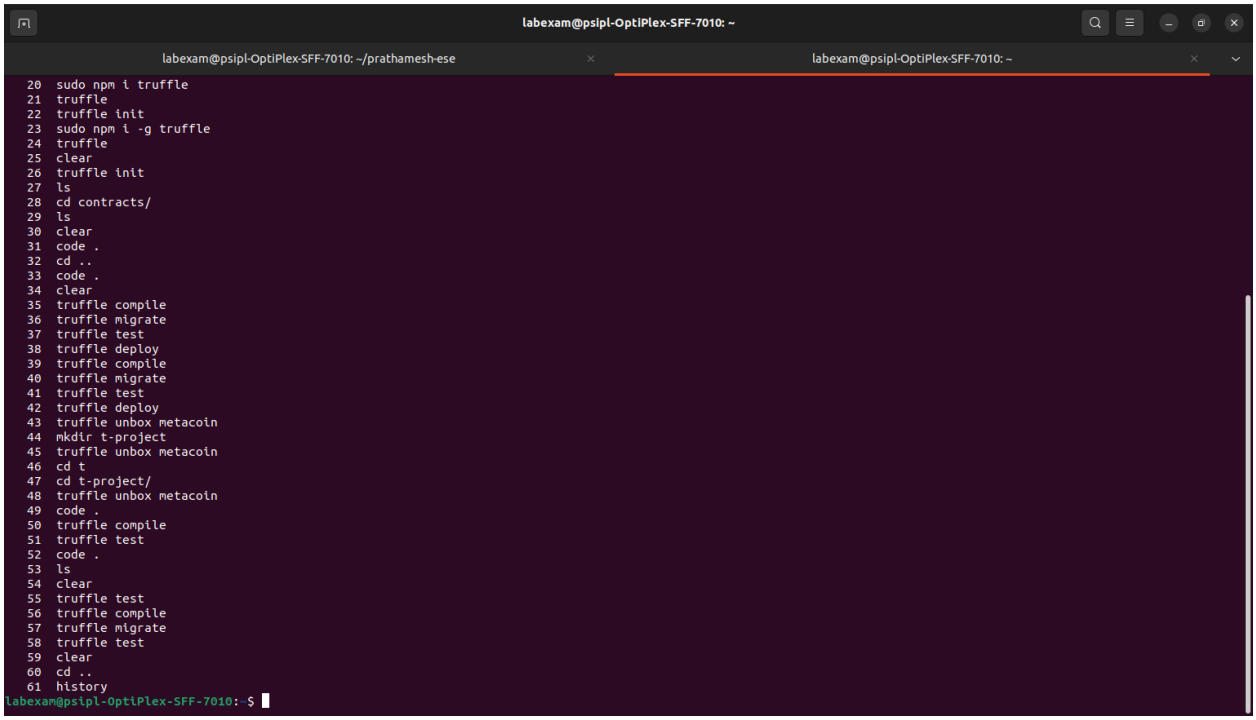

Gas used here is 338527




Classwork for OEIT1-BCT
Prathamesh Mundada - L
MetaMask
Remix - Ethereum IDE
Ethereum Transaction Ha
MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#
Relaunch to update
METAMASK
Local
Account 2
0xFd880...4341E
99.5862 ETH
Buy & Sell
Send
Swap
Bridge
Portfolio
Tokens
NFTs
Activity
Receive
ETH
Ethereum
99.5862 ETH
Import tokens
Refresh list
MetaMask support
Back up your Secret Recovery Phrase to keep your wallet and funds secure.
Back up now

History:


labexam@psipl-OptiPlex-SFF-7010: ~
labexam@psipl-OptiPlex-SFF-7010: ~/prathamesh-ese
labexam@psipl-OptiPlex-SFF-7010: ~
labexam@psipl-OptiPlex-SFF-7010:~$ history
1 sudo npm i truffle
2 truffle
3 curl -fsSL https://deb.nodesource.com/setup_lts.x | sudo -E bash -
4 sudo apt-get install -y nodejs
5 sudo apt remove nodejs npm
6 sudo apt-get install -y nodejs
7 node --version
8 sudo apt install nodejs
9 node --v
10 node --version
11 sudo apt remove nodejs npm
12 sudo apt autoremove
13 node --version
14 sudo apt-get update
15 sudo apt-get install -y nodejs
16 node --version
17 npx --versison
18 npx --version
19 clear
20 sudo npm i truffle
21 truffle
22 truffle init
23 sudo npm i -g truffle
24 truffle
25 clear
26 truffle init
27 ls
28 cd contracts/
29 ls
30 clear
31 code .
32 cd ..
33 code .
34 clear
35 truffle compile
36 truffle migrate
37 truffle test
38 truffle deploy
39 truffle compile
40 truffle migrate
41 truffle test
42 truffle deploy


labexam@psipl-OptiPlex-SFF-7010: ~
labexam@psipl-OptiPlex-SFF-7010: ~/prathamesh-ese
labexam@psipl-OptiPlex-SFF-7010: ~
20 sudo npm i truffle
21 truffle
22 truffle init
23 sudo npm i -g truffle
24 truffle
25 clear
26 truffle init
27 ls
28 cd contracts/
29 ls
30 clear
31 code .
32 cd ..
33 code .
34 clear
35 truffle compile
36 truffle migrate
37 truffle test
38 truffle deploy
39 truffle compile
40 truffle migrate
41 truffle test
42 truffle deploy
43 truffle unbox metacoin
44 mkdir t-project
45 truffle unbox metacoin
46 cd t
47 cd t-project/
48 truffle unbox metacoin
49 code .
50 truffle compile
51 truffle test
52 code .
53 ls
54 clear
55 truffle test
56 truffle compile
57 truffle migrate
58 truffle test
59 clear
60 cd ..
61 history
labexam@psipl-OptiPlex-SFF-7010:~$