

Getting Started with Ethereum

Contents

| | | |
|----------|--|----------|
| 1 | Installation | 2 |
| 1.1 | Windows | 2 |
| 1.1.1 | Go Ethereum | 2 |
| 1.1.2 | Git | 2 |
| 1.1.3 | Node.js | 2 |
| 1.1.4 | MetaMask | 3 |
| 1.2 | Ubuntu | 3 |
| 1.2.1 | Go Ethereum | 3 |
| 1.2.2 | Git | 3 |
| 1.2.3 | Node.js | 3 |
| 1.2.4 | MetaMask | 4 |
| 2 | Private Blockchain Network | 4 |
| 2.1 | Init | 4 |
| 2.2 | Start the network | 4 |
| 2.3 | Attach to Geth Console | 5 |
| 2.4 | Geth Modules | 5 |
| 2.4.1 | Modules | 5 |
| 2.5 | List All Accounts | 5 |
| 2.6 | Create a new account | 5 |
| 2.7 | Check account balance | 5 |
| 2.8 | Earn ether | 6 |
| 2.8.1 | Set Etherbase | 6 |
| 2.8.2 | Start Mining | 6 |
| 2.8.3 | Stop Mining | 6 |
| 2.9 | Check balance again | 6 |
| 2.10 | View block details | 6 |
| 2.11 | Making a transaction | 7 |
| 2.12 | Making transactions using MetaMask | 7 |

| | | |
|--------|--|----|
| 2.12.1 | Setup a wallet | 7 |
| 2.12.2 | Connect MetaMask to our private blockchain network | 11 |
| 2.12.3 | Import accounts to MetaMask | 13 |
| 2.12.4 | Send Ether | 15 |

1 Installation

1.1 Windows

1.1.1 Go Ethereum

- Official Go language implementation of the Ethereum protocol
- Available as a standalone program or as a library that you can embed in your Go programs

1. Steps

- (a) Download a pre-compiled binary from the downloads page <https://geth.ethereum.org/downloads/>
- (b) Install the exe file

1.1.2 Git

Git is a free and open source distributed version control system.

1. Steps

- (a) Download a pre-built latest installer from the downloads page <https://git-scm.com/download/win>
- (b) Install the exe file with default options

1.1.3 Node.js

Node.js is a JavaScript runtime built on Chrome's V8 JavaScript engine.

1. Steps

- (a) Download a pre-built installer from the downloads page - LTS version <https://nodejs.org/en/download/>
- (b) Install the exe file with default options

1.1.4 MetaMask

1. Steps

- (a) Visit `https://metamask.io/download.html` in Google Chrome or Firefox
- (b) Install the browser extension
- (c) Create a default wallet

1.2 Ubuntu

1.2.1 Go Ethereum

- Official Go language implementation of the Ethereum protocol
- Available as a standalone program or as a library that you can embed in your Go programs

1. Steps

```
sudo add-apt-repository -y ppa:ethereum/ethereum
sudo apt-get update
sudo apt-get install ethereum
```

1.2.2 Git

Git is a free and open source distributed version control system.

1. Steps

```
sudo apt-get update
sudo apt-get install git
```

1.2.3 Node.js

Node.js is a JavaScript runtime built on Chrome's V8 JavaScript engine.

1. Steps Install NodeVersionManager(NVM) - POSIX-compliant bash script to manage multiple active node.js versions

```
curl -o- https://raw.githubusercontent.com/nvm-sh/nvm/v0.39.0/install.sh | bash
source ~/.bashrc
nvm install 16.13.1
```

1.2.4 MetaMask

1. Steps

- (a) Visit <https://metamask.io/download.html> in Google Chrome or Firefox
- (b) Install the browser extension
- (c) Create a default wallet

2 Private Blockchain Network

2.1 Init

Create genesis.json file

```
{
  "coinbase" : "0x0000000000000000000000000000000000000000000000000000000000000001",
  "difficulty": "0x400",
  "extraData" : "",
  "gasLimit" : "0x8000000",
  "nonce" : "0x00000000000000042",
  "mixhash" : "0x0000000000000000000000000000000000000000000000000000000000000000",
  "parentHash": "0x0000000000000000000000000000000000000000000000000000000000000000",
  "timestamp" : "0x00",
  "alloc": {},
  "config": {
    "chainId": 15,
    "homesteadBlock": 0,
    "eip150Block": 0,
    "eip155Block": 0,
    "eip158Block": 0
  }
}
```

Initialize chain data

```
geth --http --http.port "8545" --datadir ./chaindata init ./genesis.json
```

2.2 Start the network

Type the following command in a single line.

```
geth --http --http.port "8545" --datadir ./chaindata
    --http.api "admin,eth,net,web3,personal,miner,txpool"
    --http.corsdomain "*" --allow-insecure-unlock
```

2.3 Attach to Geth Console

```
geth attach http://localhost:8545
```

2.4 Geth Modules

The Geth JavaScript console exposes the full web3 JavaScript Dapp API and further administrative APIs.

2.4.1 Modules

1. Admin
2. Eth
3. Miner
4. Net
5. Personal
6. RPC
7. Txpool
8. Web3

2.5 List All Accounts

```
eth.accounts
```

2.6 Create a new account

```
personal.newAccount()
```

Create three accounts. We will use these accounts to make transactions

2.7 Check account balance

```
eth.getBalance(eth.accounts[0])
```

2.8 Earn ether

1. Mining
2. Receiving from someone

2.8.1 Set Etherbase

Before starting the mining process, we have to set the etherbase (or coinbase) to a particular account. So that the rewards from successfully mining a block will be added to that account. With the following command, we are setting the coinbase to the first account.

```
miner.setEtherbase(eth.accounts[0])
```

2.8.2 Start Mining

```
miner.start(8)
```

`miner.start` takes an optional parameter for the number of miner threads. Since, we have the set the difficulty of the puzzles to be very low in the genesis block, the mining process will start solving the puzzles and starts creating blocks, resulting in rewards being added to the coinbase account.

2.8.3 Stop Mining

```
miner.stop()
```

2.9 Check balance again

```
eth.getBalance(eth.accounts[0])
```

2.10 View block details

```
eth.blockNumber  
eth.getBlock(22)
```

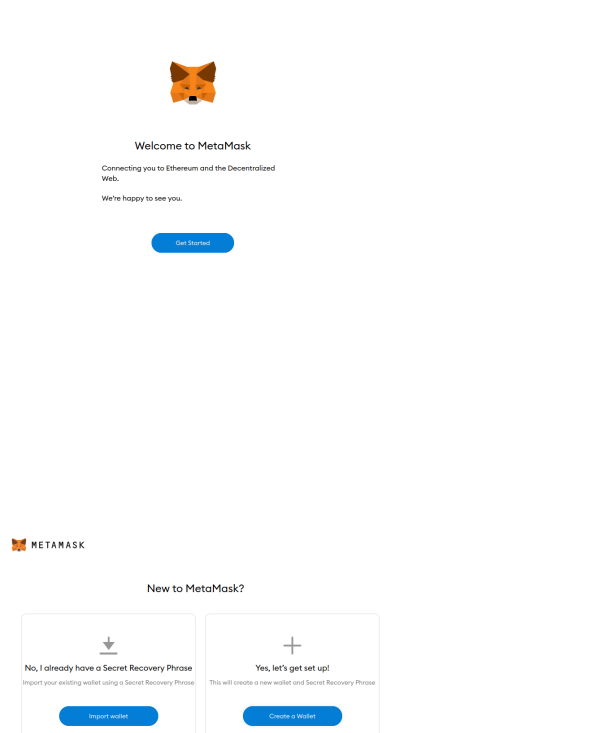
we can see that the transactions array is empty,since we haven't made any transactions yet. These are called empty blocks.

2.11 Making a transaction

```
eth.getBalance(eth.accounts[0])
personal.unlockAccount(eth.accounts[0], <passphrase>)
let sender = eth.accounts[0]
let receiver = eth.accounts[1]
let amount = web3.toWei(1, "ether")
eth.sendTransaction({from:sender, to:receiver, value: amount})
```

2.12 Making transactions using MetaMask

2.12.1 Setup a wallet





Help us improve MetaMask

MetaMask would like to gather usage data to better understand how our users interact with the extension. This data will be used to continually improve the usability and user experience of our product and the Ethereum ecosystem.

MetaMask will...

- ✓ Always allow you to opt-out via Settings
- ✓ Send anonymized click & pageview events

- ✗ **Never** collect keys, addresses, transactions, balances, hashes, or any personal information
- ✗ **Never** collect your full IP address
- ✗ **Never** sell data for profit. Ever!

No Thanks

I Agree

This data is aggregated and is therefore anonymous for the purposes of General Data Protection Regulation (EU) 2016/679. For more information in relation to our privacy practices, please see our [Privacy Policy here](#).



< Back

Create Password

New password (min 8 chars)

Confirm password



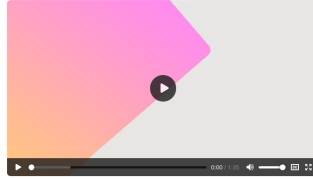
I have read and agree to the [Terms of Use](#)

Create



Secure your wallet

Before getting started, watch this short video to learn about your Secret Recovery Phrase and how to keep your wallet safe.



Next

What is a Secret Recovery Phrase?

Your Secret Recovery Phrase is a 12-word phrase that is the "master key" to your wallet and your funds.

How do I save my Secret Recovery Phrase?

- Save in a password manager
- Store in a bank vault.
- Store in a safe-deposit box.
- Write down and store in multiple secret places.

Should I share my Secret Recovery Phrase?

Never, ever share your Secret Recovery Phrase, not even with MetaMask!

If someone asks for your recovery phrase they are likely trying to scam you and steal your wallet funds.



< Back

Secret Recovery Phrase

Your Secret Recovery Phrase makes it easy to back up and restore your account.

WARNING: Never disclose your Secret Recovery Phrase. Anyone with this phrase can take your Ether forever.



Remind me later

Next

Tip:

Store this phrase in a password manager like iPassword.

Write this phrase on a piece of paper and store in a secure location. If you want even more security, write it down on multiple pieces of paper and store each in 2 - 3 different locations.

Memorize this phrase.

Download this Secret Recovery Phrase and keep it stored safely on an external encrypted hard drive or storage medium.

Download this Secret Recovery Phrase



Secret Recovery Phrase

Your Secret Recovery Phrase makes it easy to look up and restore your account.

WARNING: Never disclose your Secret Recovery Phrase. Anyone with this phrase can take your Ether forever.

choose swap drill wear settle
aerobic bridge stable waste peanut
moon liar

Remind me later Next

Tip:

Store this phrase in a password manager like 1Password.

Write this phrase on a piece of paper and store in a secure location. If you want even more security, write it down on multiple pieces of paper and store each in 2 - 3 different locations.

Memorize this phrase.

Download this Secret Recovery Phrase and keep it stored safely on an external encrypted hard drive or storage medium.



Confirm your Secret Recovery Phrase

Please select each phrase in order to make sure it is correct.

| | | | |
|--------|---------|--------|--------|
| choose | swap | drill | wear |
| settle | aerobic | bridge | stable |
| waste | peanut | moon | liar |

| | | | |
|---------|--------|--------|--------|
| aerobic | bridge | choose | drill |
| liar | moon | peanut | settle |
| stable | swap | waste | wear |

Confirm



Congratulations

You passed the test - keep your Secret Recovery Phrase safe, it's your responsibility!

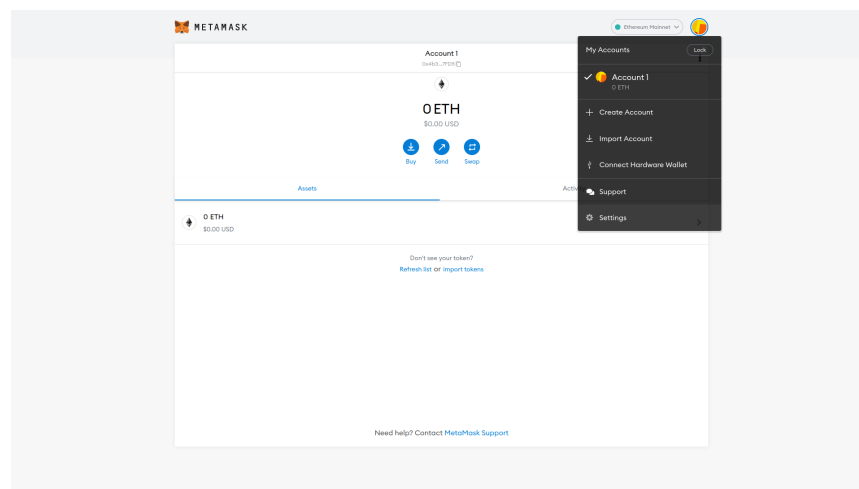
Tips on storing it safely

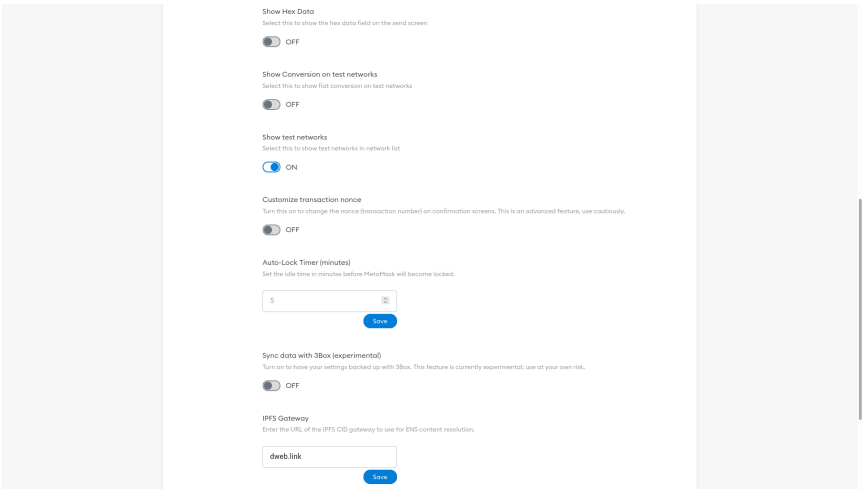
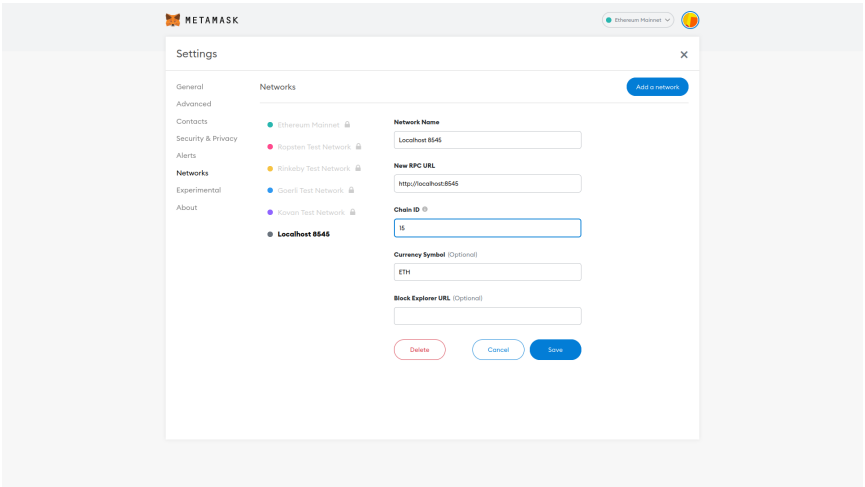
- Save a backup in multiple places.
- Never share the phrase with anyone.
- Be careful of phishing! MetaMask will never spontaneously ask for your Secret Recovery Phrase.
- If you need to back up your Secret Recovery Phrase again, you can find it in Settings -> Security.
- If you ever have questions or see something fishy, contact our support [here](#).

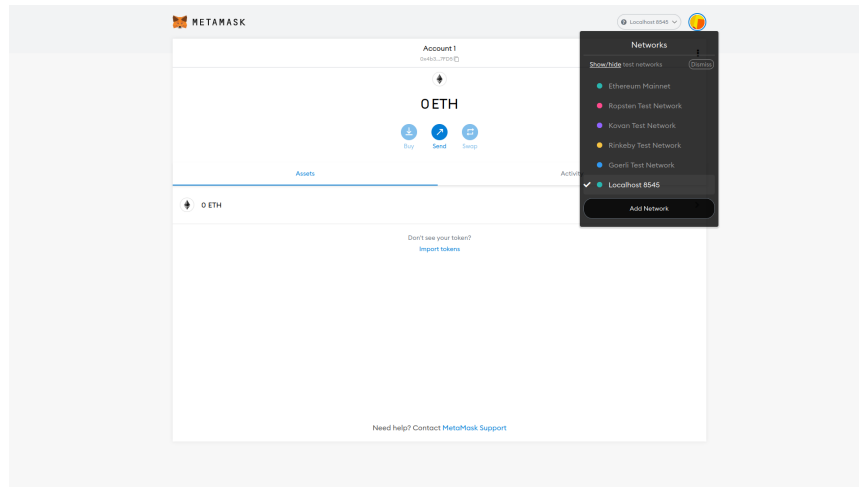
*MetaMask cannot recover your Secret Recovery Phrase. [Learn more](#).

All Done

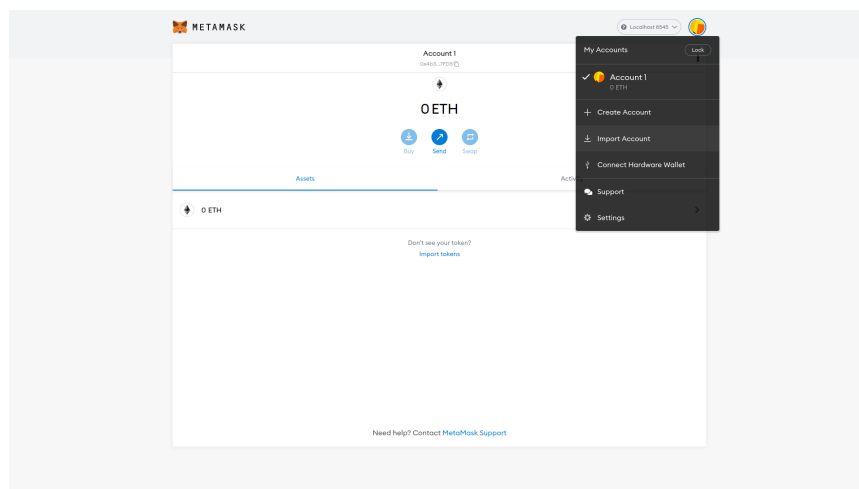
2.12.2 Connect MetaMask to our private blockchain network



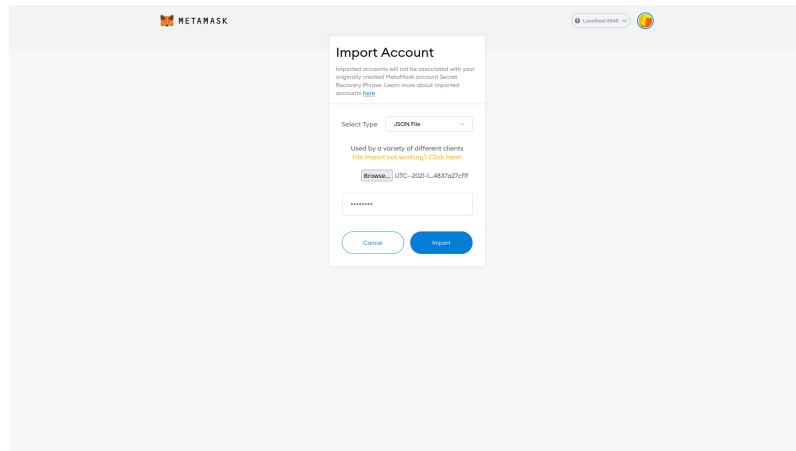




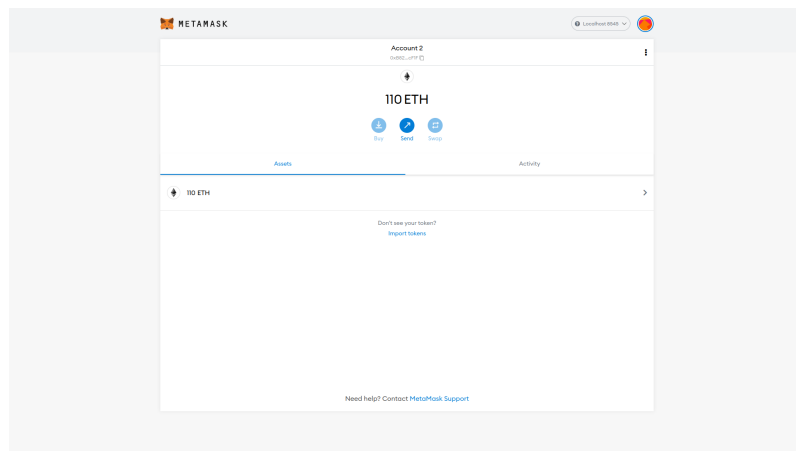
2.12.3 Import accounts to MetaMask



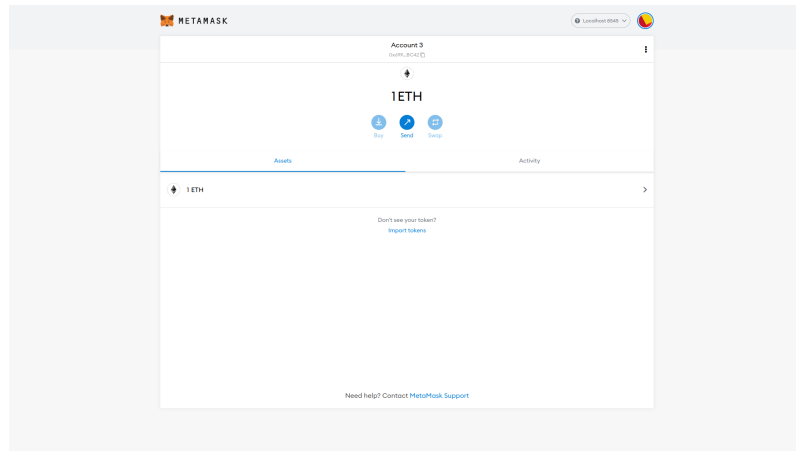
1. **Import Miner Account.** First lets import the miner account. Select type as JSON file. Browse and select the JSON file. You can find the files inside the `./chaindata/keystore` directory.



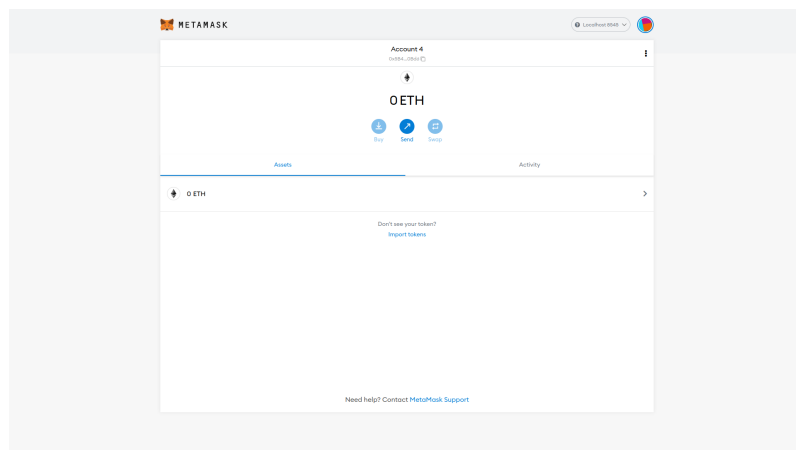
We can see the balance earned by mining blocks.



2. **Import Second Account.** Let's import the second account. If you have completed the transaction in Geth console successfully, you can see the balance as 1 Ether.

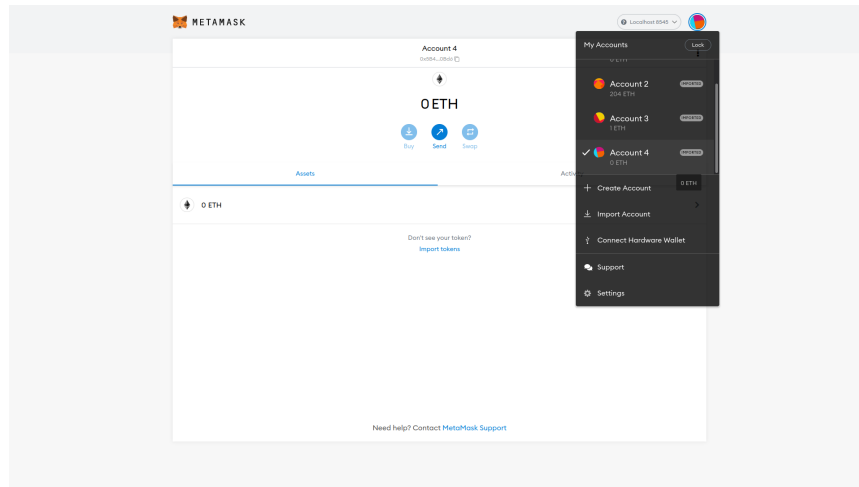


3. Import Third Account. Let's import the third account. Balance should be 0.

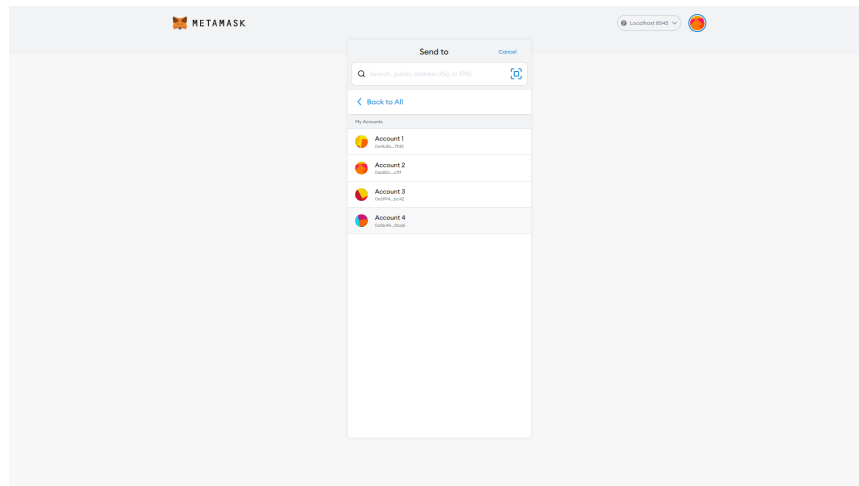


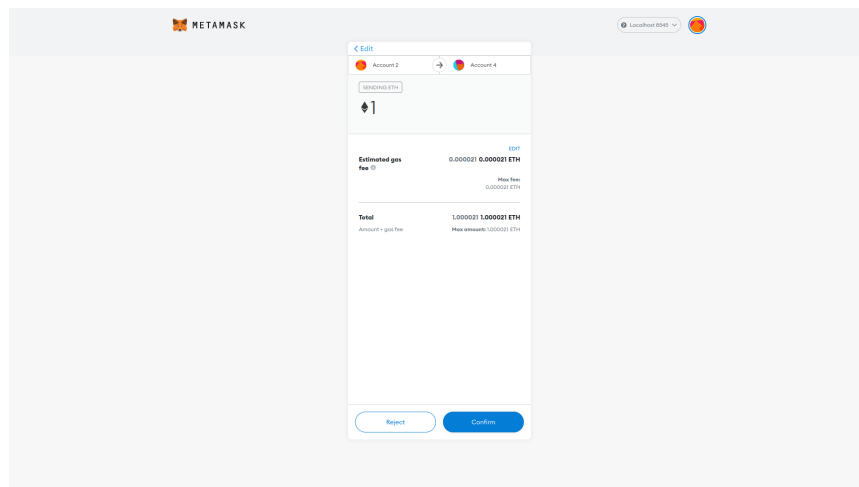
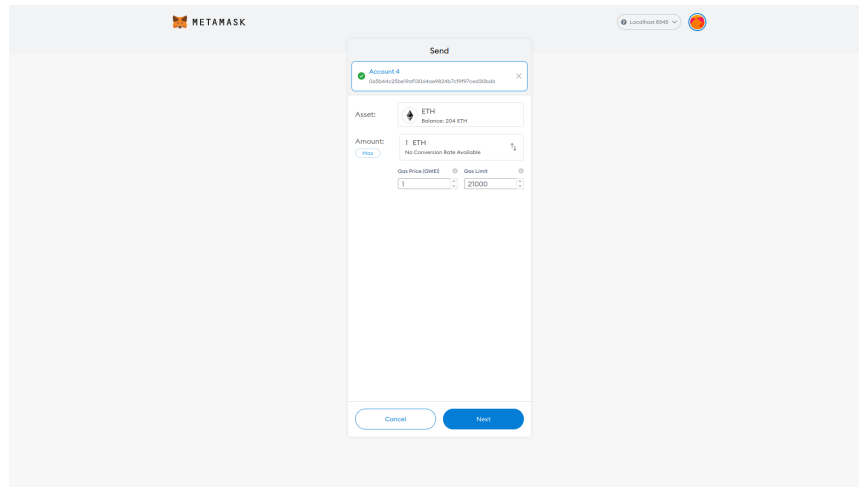
2.12.4 Send Ether

Select the miner account from the dropdown. And click send to transfer between accounts.

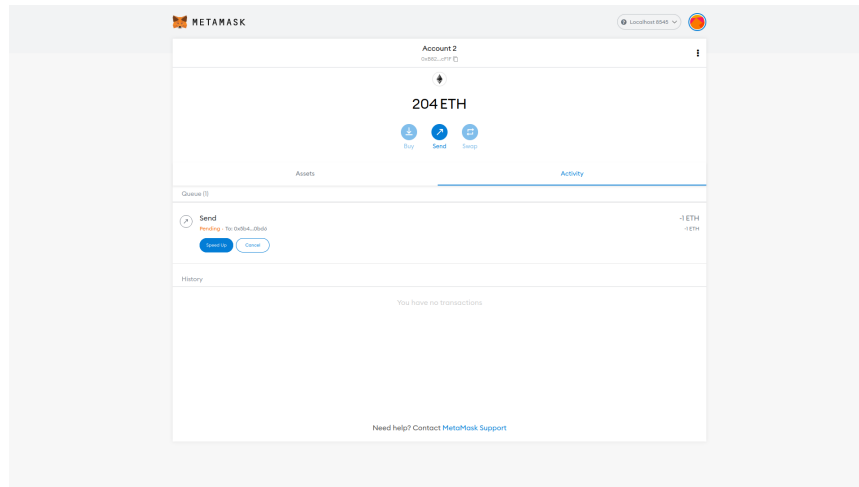


Send to account Account 4 which is the third imported account.

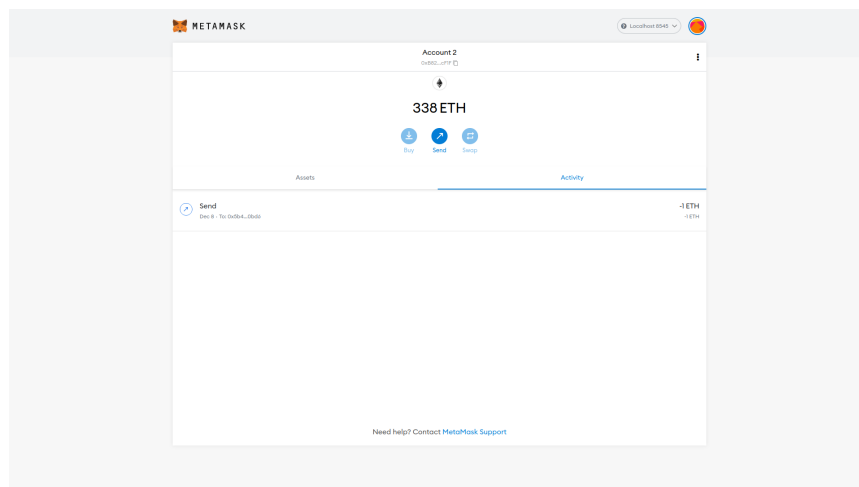


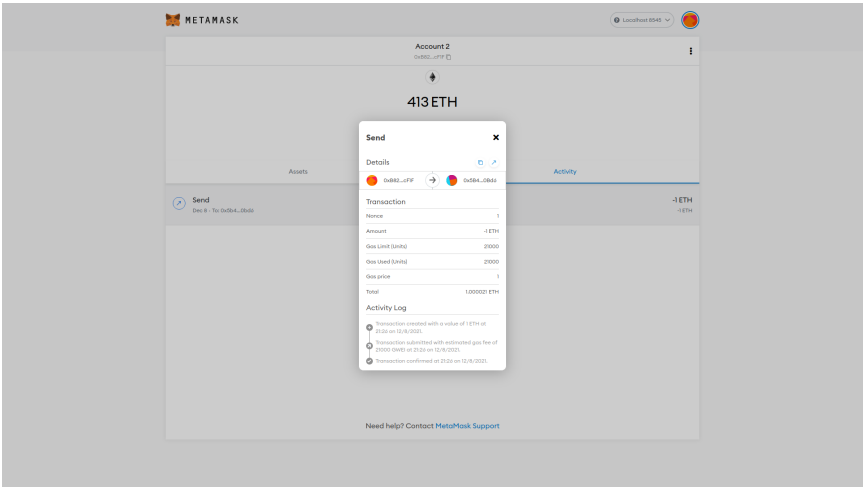


We can see that the transaction has been submitted and the status is pending. We have to start the mining now.



Miner will receive the submitted transactions and create blocks with transactions after solving puzzles. We can see the balance of the miner account has increased by earning rewards.





Check the balance of the third imported account

