Connecting Metamask with a Local Hardhat Network

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Metamask is an essential tool in the Ethereum space as it creates a user-friendly interface for interacting with the blockchain. For developers, being able to connect your local network instance to Metamask significantly streamlines the development process as we're able to see the end-user experience upfront.

This is a quick guide to connecting Metamask to your local Hardhat node. If you would like to learn how to programatically interact with Metamask:

- Connecting Metamask to your Web Application (Express)
- Connect Metamask with Ethers.js

For further info on how to deploy and interact with smart contracts (tokens, NFTs, decentralised storage), you can refer to my other guides:

- ERC20 Using Hardhat: An Updated Comprehensive Guide
- ERC721 Using Hardhat: An Updated Comprehensive Guide To NFTs
- Creating Truly Decentralised NFTs — A Comprehensive Guide to ERC721 & IPFS

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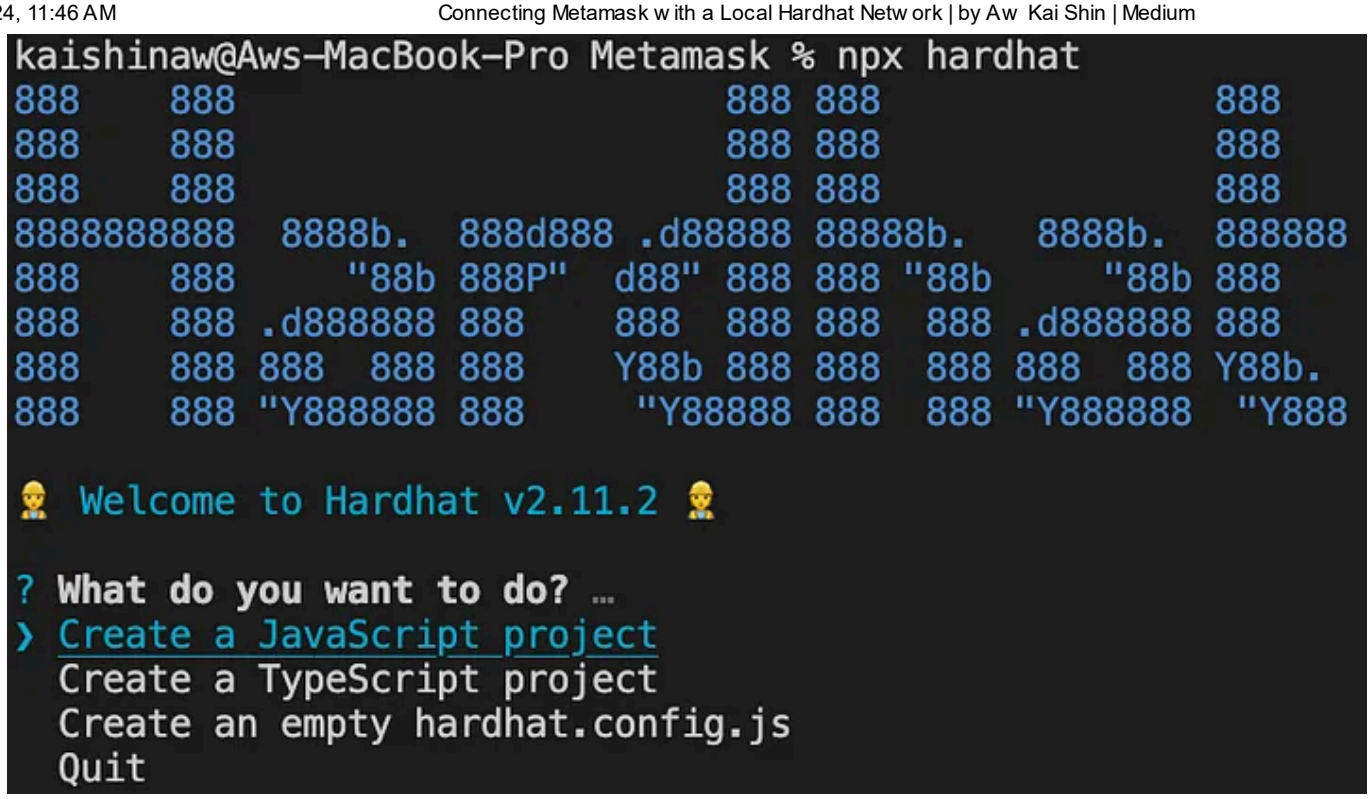
Hardhat Setup

We first need to crate a project directory and install Hardhat:

```
mkdir Metamask
cd Metamask
npm install --save-dev hardhat
```

Once the `hardhat` package has been installed, we can then run `npx hardhat` which will bring up some options for bootstrapping the project:



We will select the `Create a JavaScript project` option. You will be prompted with a series of questions which you can continuously select enter to. For the purpose of this guide, we will not be modifying the default template as we just need Hardhat's local node deployment capabilities.

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Running a Local Hardhat Network

Hardhat greatly simplifies the process of setting up a local network by having an in-built local blockchain which can be easily run through a single line of code:

```
npx hardhat node
```

Running the above command, you will get the RPC endpoint as well as a list of locally generated accounts. We will need the endpoint as well as the private keys for configuring Metamask.

```
kaishinaw@Aws-MacBook-Pro Metamask % npx hardhat node
Started HTTP and WebSocket JSON-RPC server at http://127.0.0.1:8545/

Accounts
========

WARNING: These accounts, and their private keys, are publicly known.
Any funds sent to them on Mainnet or any other live network WILL BE LOST.

Account #0: 0xf39Fd6e51aad88F6F4ce6aB8827279cffFb92266 (10000 ETH)
Private Key: 0xac0974bec39a17e36ba4a6b4d238ff944bacb478cbed5efcae784d7bf4f2ff80

Account #1: 0x70997970C51812dc3A010C7d01b50e0d17dc79C8 (10000 ETH)
Private Key: 0x59c6995e998f97a5a0044966f0945389dc9e86dae88c7a8412f4603b6b78690d

Account #2: 0x3C44CdDdB6a900fa2b585dd299e03d12FA4293BC (10000 ETH)
Private Key: 0x5de4111afa1a4b94908f83103eb1f1706367c2e68ca870fc3fb9a804cdab365a
```

Do take note that this local blockchain only stores the interactions until the console is closed hence the state is not preserved between runs. Additionally, take the time to read through the details of the accounts as it is important that you do not use these sample accounts for sending any real money.

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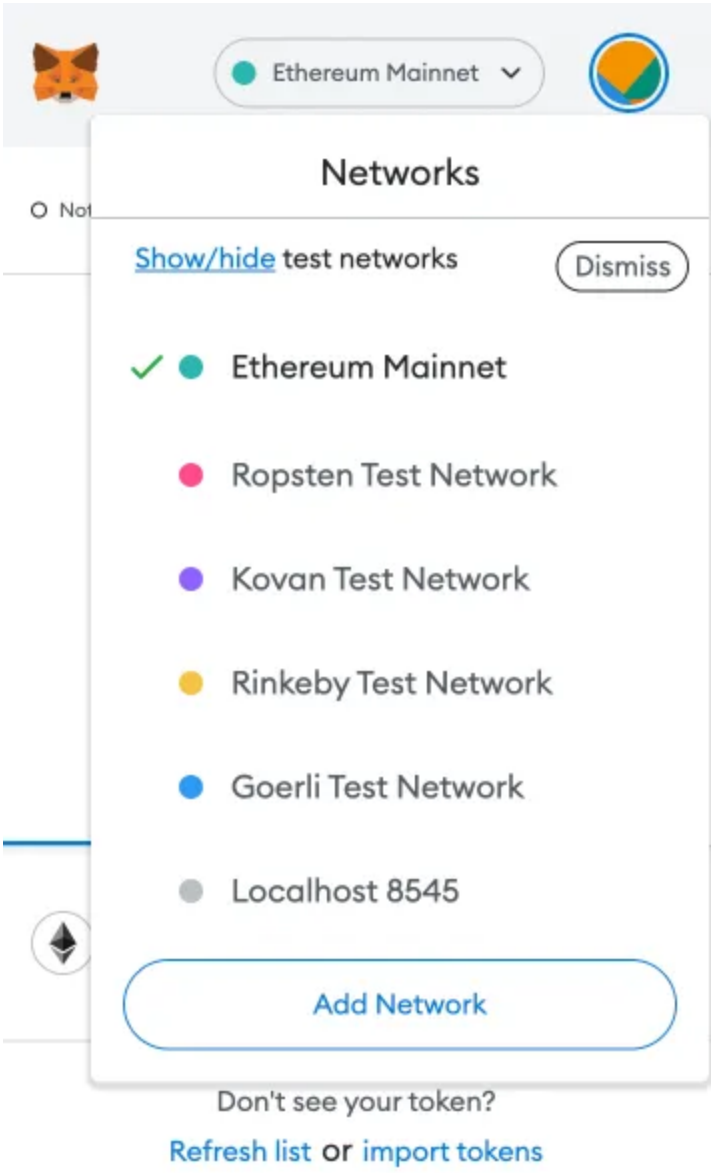
Add Local Network to Metamask

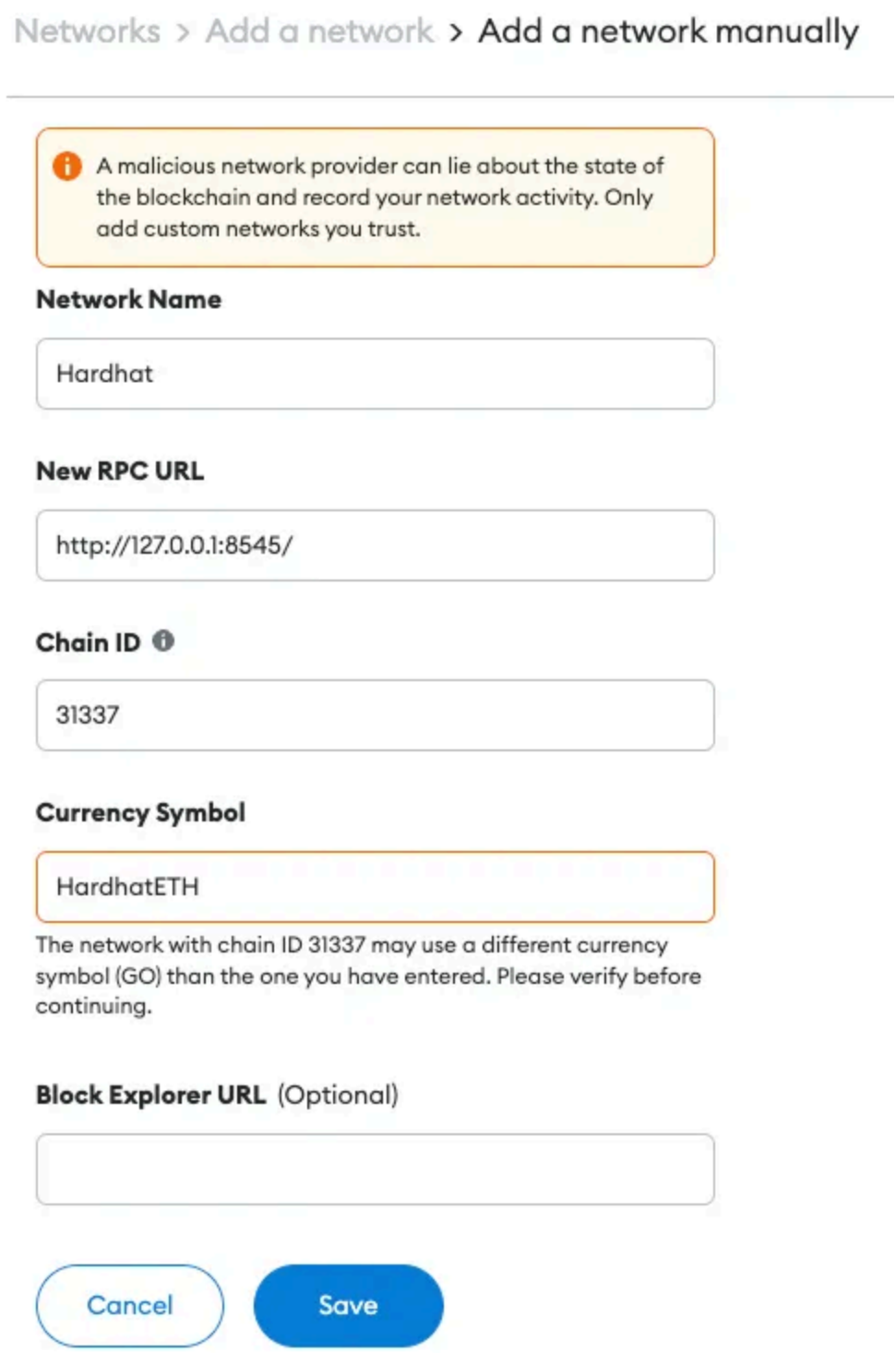
With our local Hardhat network running, we can then configure our Metamask to connect to it. In a browser with Metamask installed, select the network dropdown (this will likely be the dropdown with “Ethereum Mainnet” listed). Do note that you will need to have enabled “Show test networks” in order to view the full list as per the below screenshot.



The quickest way to get connected is by selecting “Localhost 8545” which connects to the default RPC endpoint that many developer tools implement. In the interest of completeness, this guide will cover how to manually setup the network with customised parameters.

Select the “Add Network” button and you will be greeted with a form requesting for the relevant network details. In order to connect to our local network, we will be using the following:

- Network Name: `Hardhat` — This is up to you and defines how the network will show up in your network dropdown.
- New RPC URL: `http://127.0.0.1:8545/` — The endpoint returned from running `npx hardhat node` earlier.
- Chain ID: `31337` — This is the default chain identifier that is implemented by Hardhat. You can refer to their documentation here.
- Currency Symbol: `HardhatETH` — This is up to you and defines the symbol for the local network currency (ie. ETH).



After saving the above, you will be able to see that a new network named "Hardhat" was created with a native currency symbol of `HARDHATETH`. Although the network is now connected, we are unable to see the accounts which have been credited with our test `HARDHATETH` as these accounts have yet to be added to Metamask.

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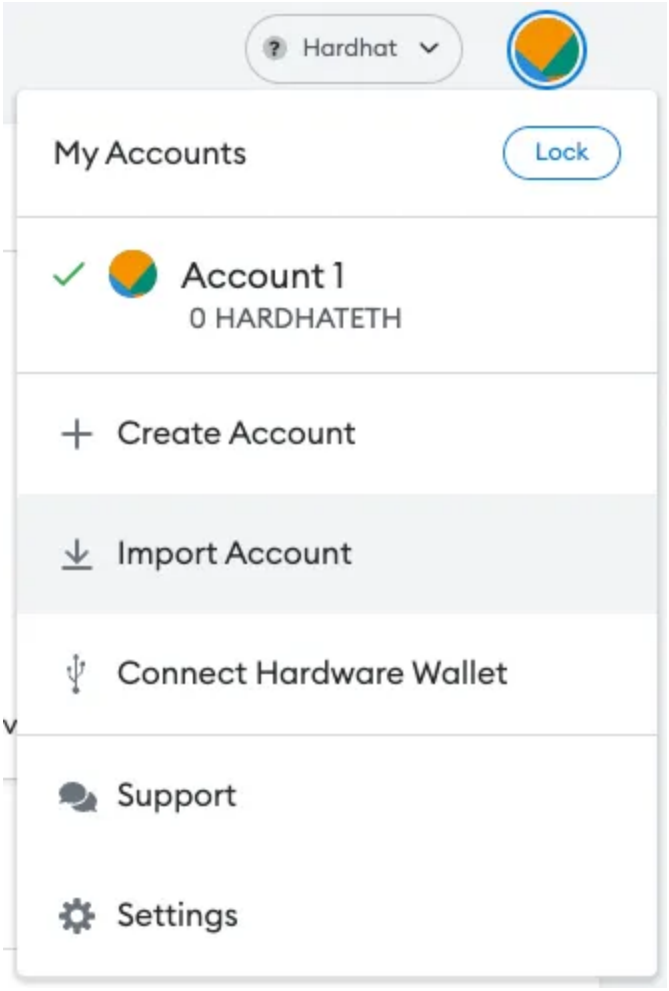
Importing Test Accounts

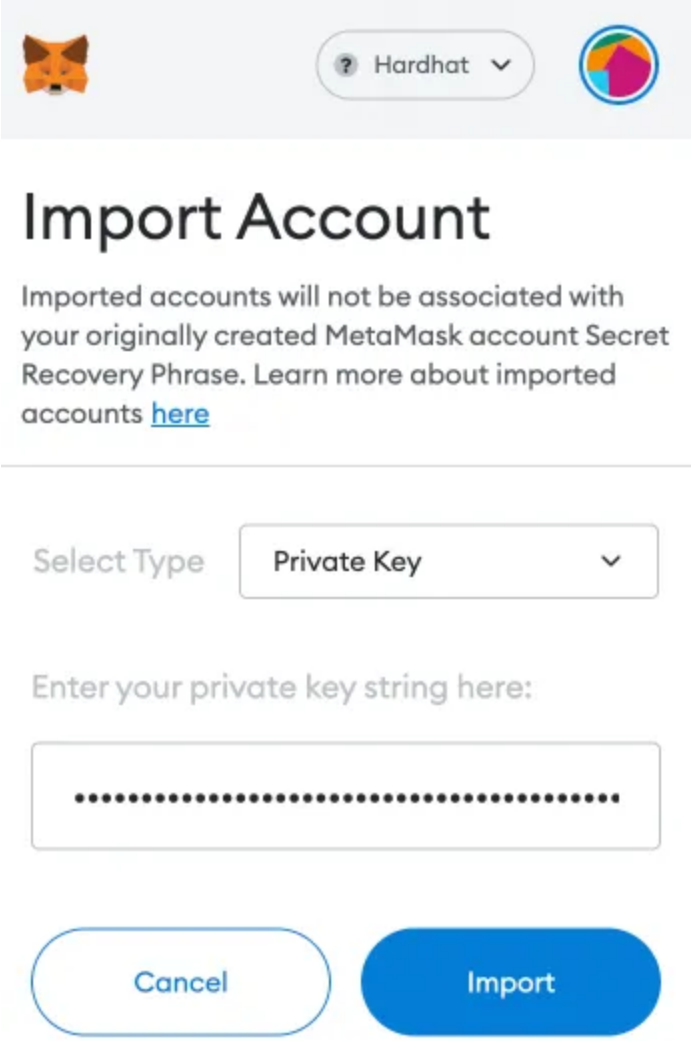
Upon starting up the local network, Hardhat has also funded a list of accounts with the native test ETH (renamed HARDHATETH in our Metamask). In order to add these accounts to Metamask, we will need to add the private keys which were returned when we ran the `npx hardhat node` command.

With the private keys in hand, we can then select the accounts tab on Metamask (this is the colourful circle on top right) which will display various options for connecting an account.

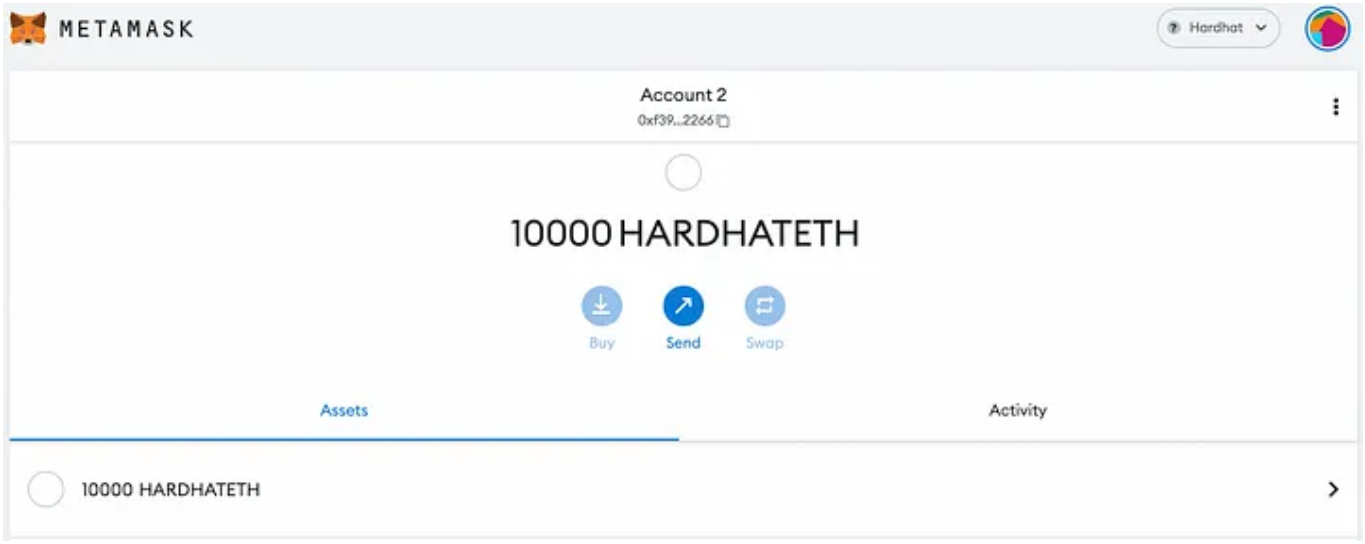


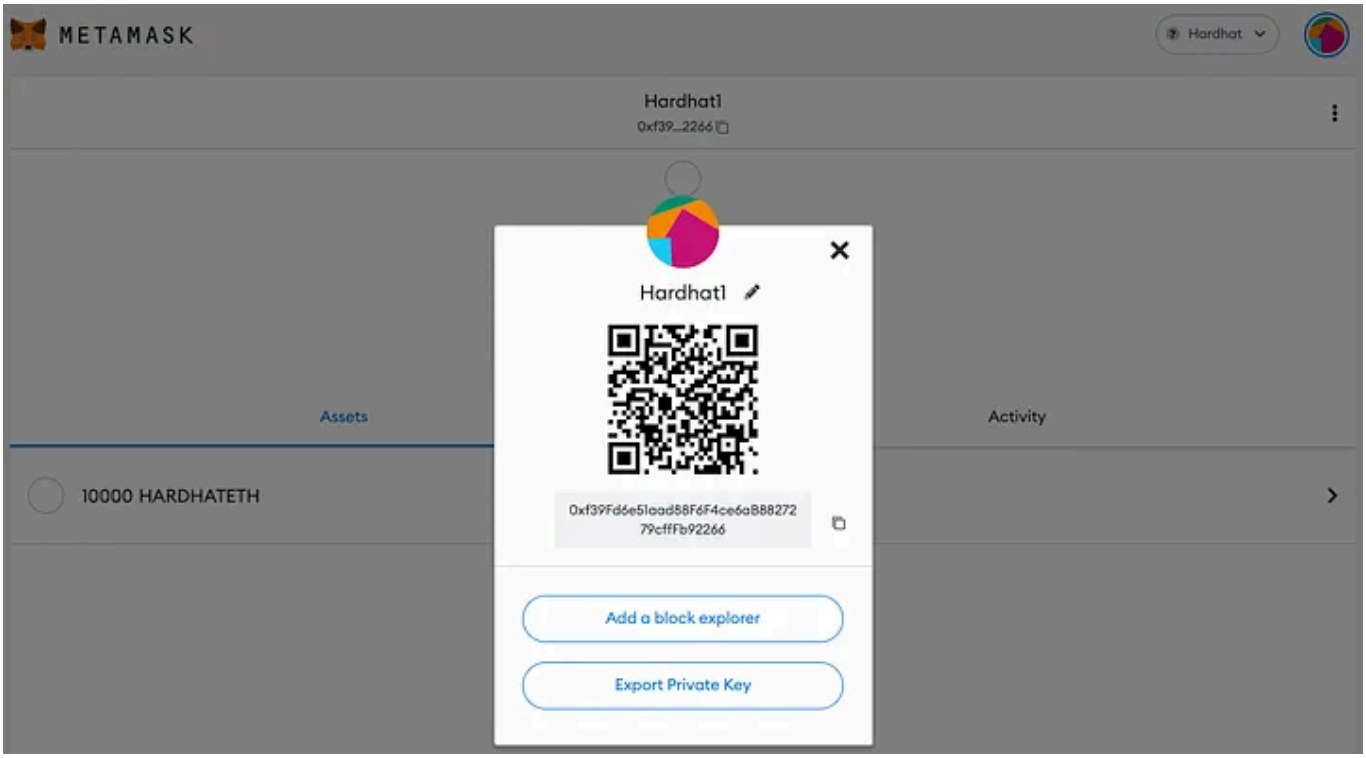
Select the “Import Account” option and Metamask will prompt you for the private key string. Paste the private keys from earlier, it should look something like this:

```
0xac0974bec39a17e36ba4a6b4d238ff944bacb478cbed5efcae784d7bf4f2ff80
```

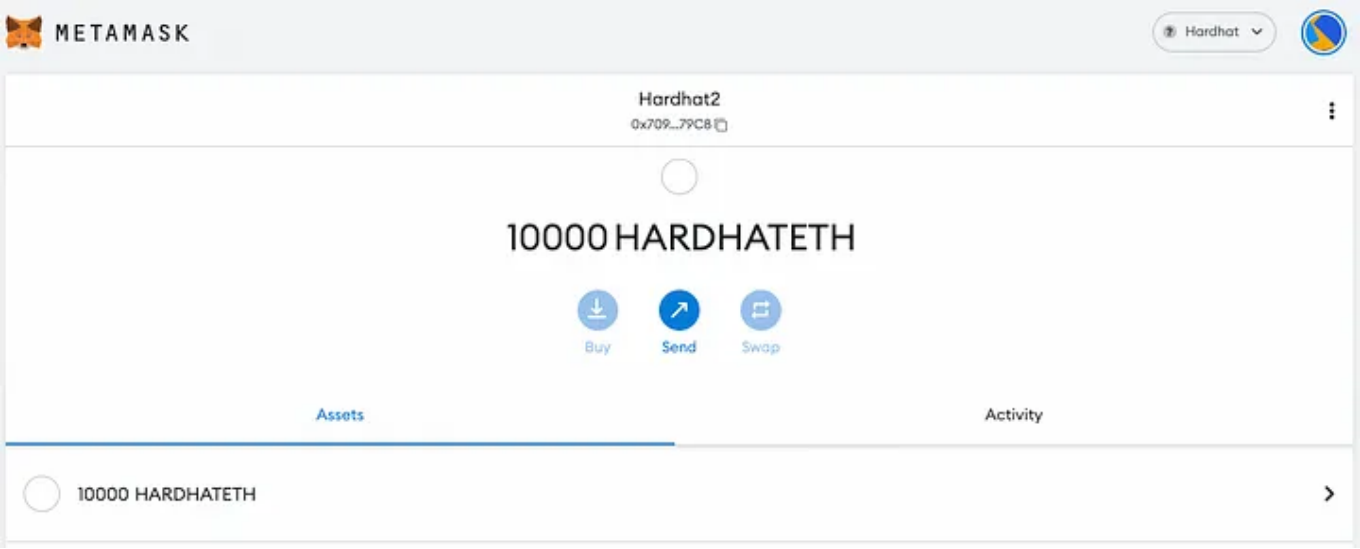


Once imported, an account with the corresponding address will have been added to Metamask. You should also be able to see a 10000 `HARDHATETH` in the imported account.





We will also continue to add the second test account to Metamask using the respective private key.



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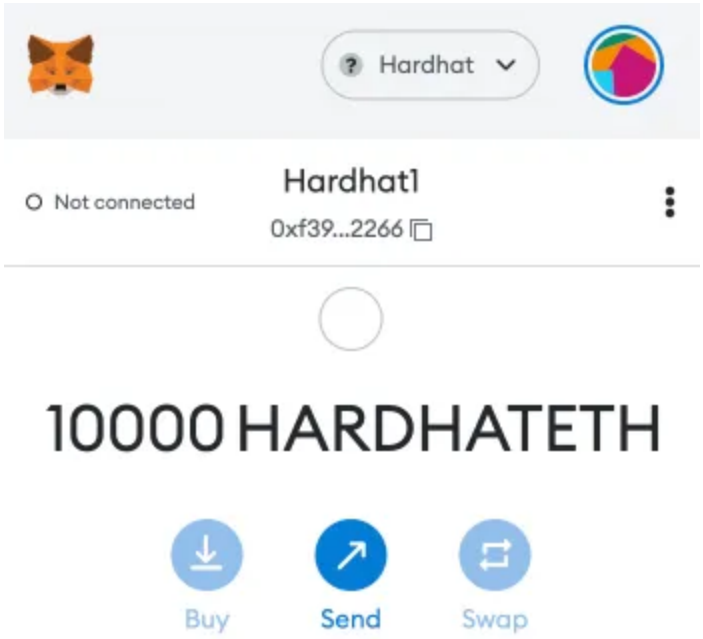
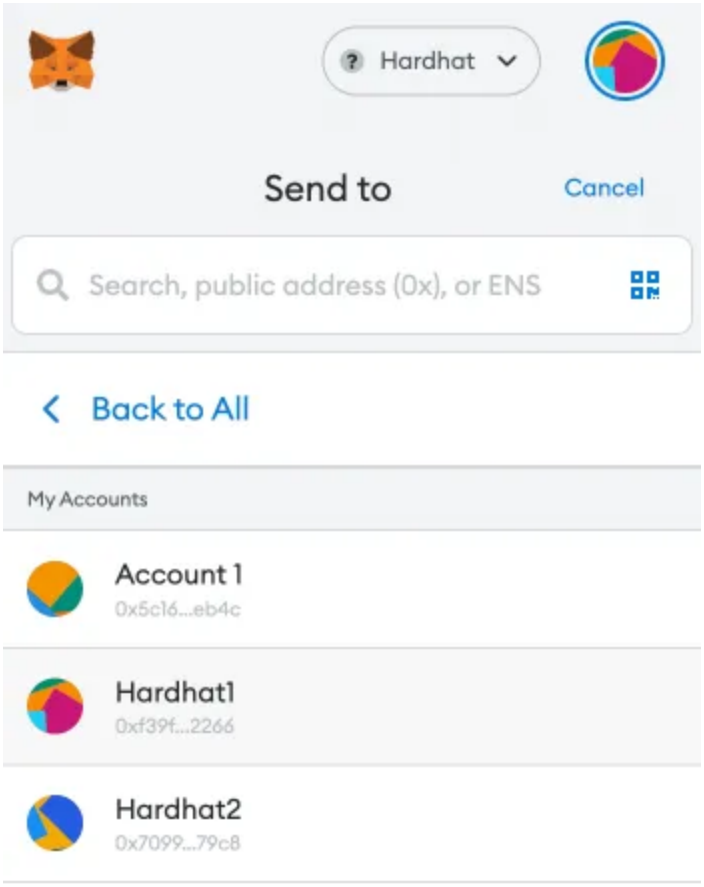
Testing the Network

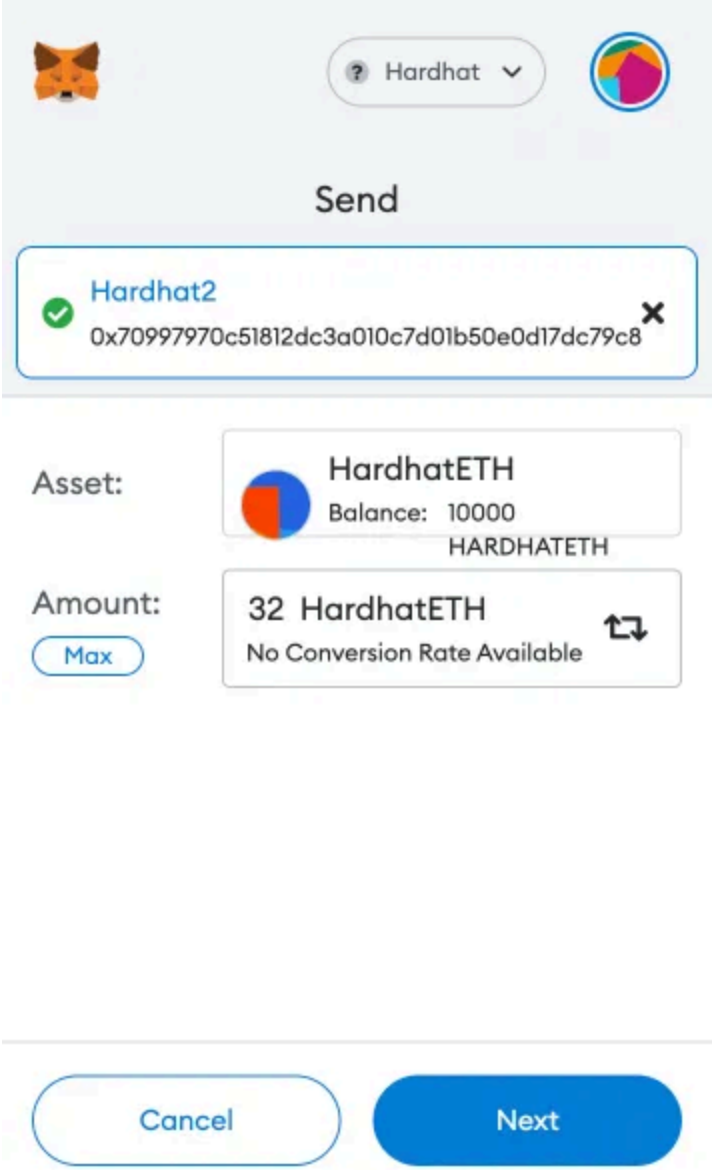
To ensure that Metamask is working with our network, we can utilise its existing send function to transfer `HARDHATETH` between our development accounts. Notice that we do not have to write any code for this as Metamask already implements the standard functionality.



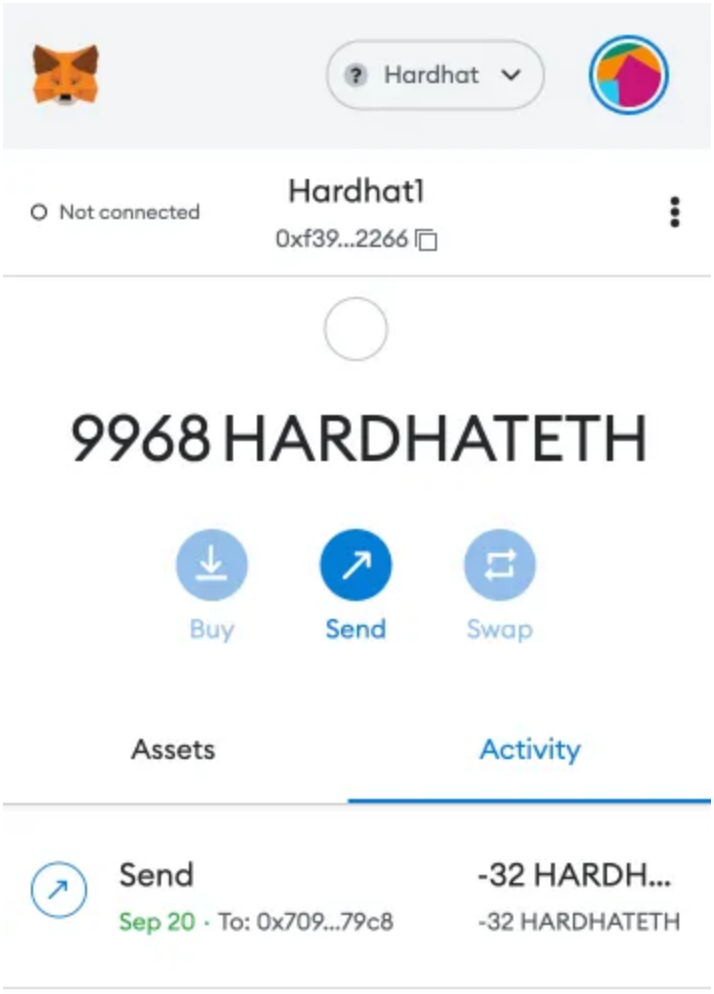
Of note, Metamask also allows us to easily transfer between our connected accounts by selecting the “Transfer between my accounts” option on the send to address page.

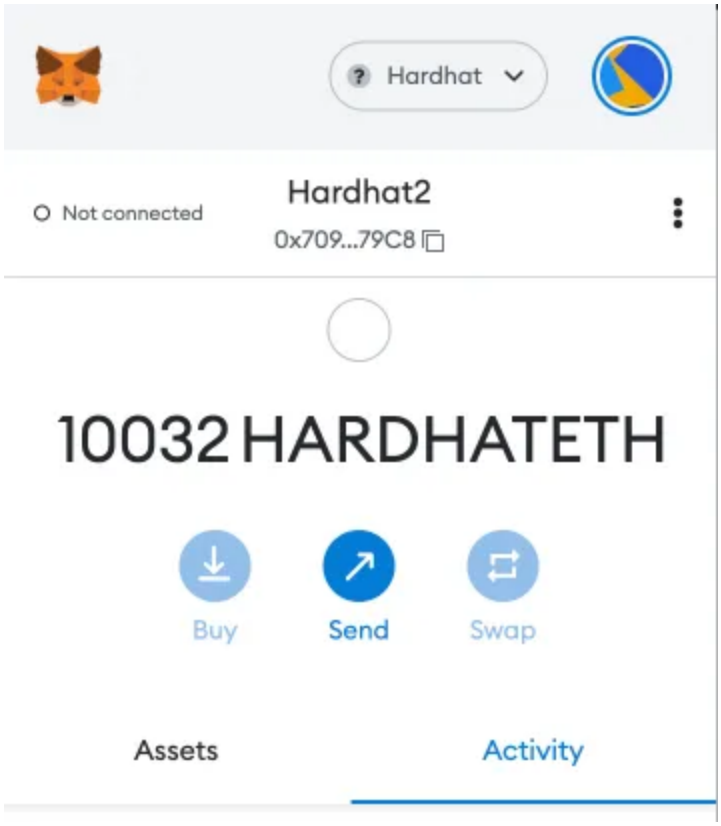


We will be transferring 32 `HARDHATETH` from our `Hardhat1` to `Hardhat2` account.



Upon confirming the send, you should be able to see 32 `HARDHATETH` being deducted from `Hardhat1` and credited into `Hardhat2`.


Hardhat
Not connected
Hardhat1
0xf39...2266
9968 HARDHATETH
Buy
Send
Swap
Assets
Activity
Send
Sep 20 · To: 0x709...79c8
-32 HARDH...
-32 HARDHATETH

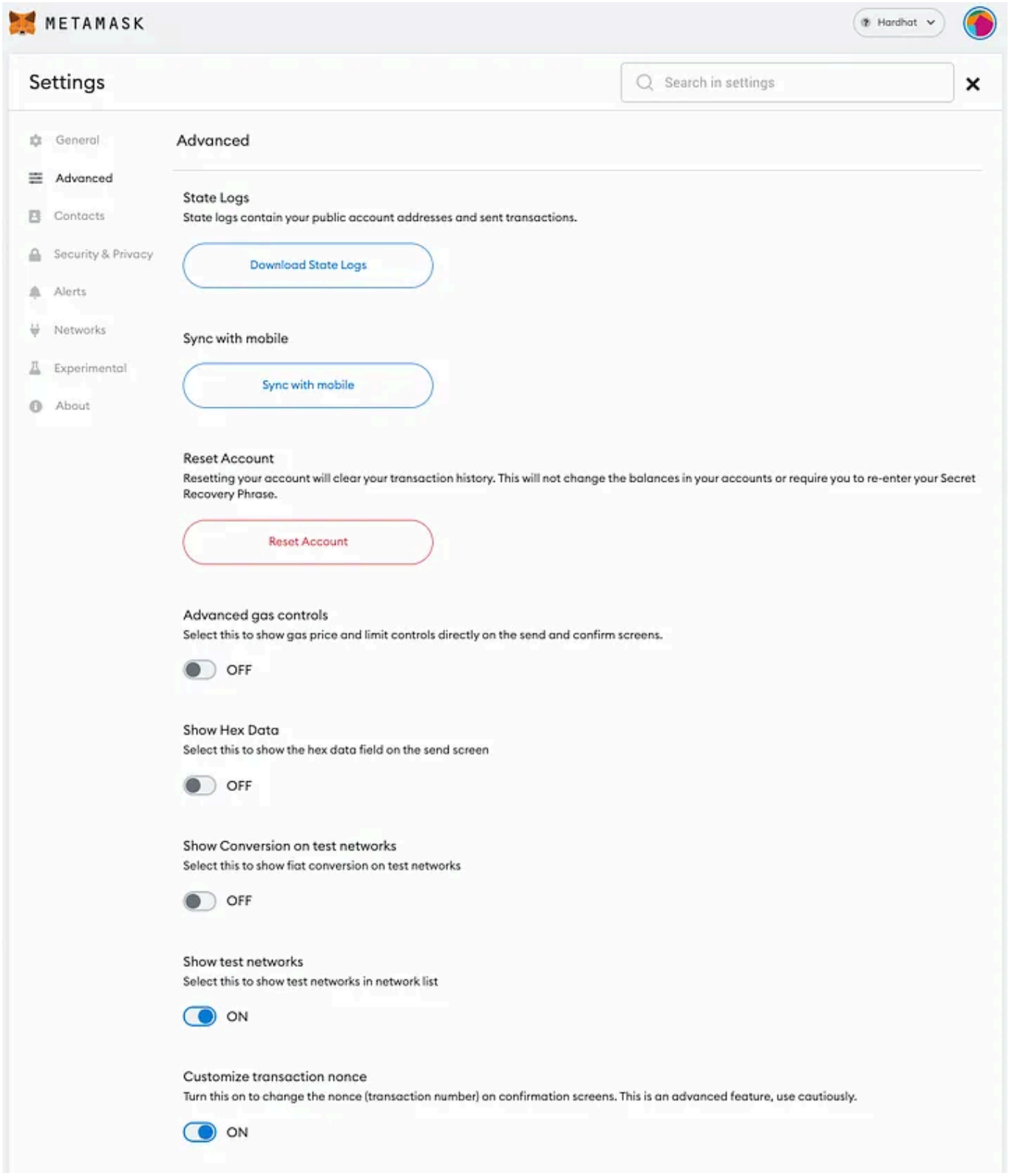

Hardhat
Not connected
Hardhat2
0x709...79C8
10032 HARDHATETH
Buy
Send
Swap
Assets
Activity

In your Hardhat console, also notice that the transaction has been logged:

```
eth_sendRawTransaction
  Transaction: 0x67f50285316d3fcce3b3b601ae55c618c61480249505c4e633e8b0ab7c8a9dbd
  From:        0xf39fd6e51aad88f6f4ce6ab8827279cfffb92266
  To:          0x70997970c51812dc3a010c7d01b50e0d17dc79c8
  Value:       32 ETH
  Gas used:    21000 of 21001
  Block #1:    0xe03b70dea95ae33d2f9aa71c8fd9f098629fa99ad2fdd20544d7fdbd0aef36c4
```

Congrats, your local Hardhat node is now connected to Metamask!

Do note that Metamask stores a nonce connected to the imported accounts hence if the local network is constantly restarted, you will need to enable the “Customize transaction nonce” option.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Hardhat
Settings
Search in settings
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Advanced
Contacts
Security & Privacy
Alerts
Networks
Experimental
About
Advanced
State Logs
State logs contain your public account addresses and sent transactions.
Download State Logs
Sync with mobile
Sync with mobile
Reset Account
Resetting your account will clear your transaction history. This will not change the balances in your accounts or require you to re-enter your Secret Recovery Phrase.
Reset Account
Advanced gas controls
Select this to show gas price and limit controls directly on the send and confirm screens.
OFF
Show Hex Data
Select this to show the hex data field on the send screen
OFF
Show Conversion on test networks
Select this to show fiat conversion on test networks
OFF
Show test networks
Select this to show test networks in network list
ON
Customize transaction nonce
Turn this on to change the nonce (transaction number) on confirmation screens. This is an advanced feature, use cautiously.
ON

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Thanks for staying till the end. Would love to hear your thought/comments so do drop a comment. I'm active on twitter @AwKaiShin if you would like to receive more digestible tidbits of crypto-related info or visit my personal website if you would like my services :)

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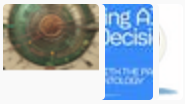

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