

Blockchain Lab 4

Aim: Implement the Blockchain platform Ganache

Theory:

Ganache is a personal blockchain development platform that allows developers to create and test Ethereum-based blockchain applications in a controlled and secure environment. It provides a local, in-memory blockchain that can be used for development, testing, and debugging of smart contracts and decentralized applications (DApps) without the need to connect to the live Ethereum network. Ganache offers features such as quick block mining, account management, and a graphical user interface, making it a valuable tool for Ethereum developers to streamline their development and testing processes.

To connect the Ganache environment with Metamask and Remix IDE for performing transactions, follow these steps:

1. Install and Set Up Ganache:

- Download and install Ganache on your system.
- Launch Ganache and create a new workspace or use the default one.

2. Connect Metamask to Ganache:

- Open the Metamask extension in your browser.
- Click on the network selection dropdown (usually showing "Mainnet" or "Ropsten") and choose "Custom RPC."

- Enter the RPC server URL from your Ganache workspace settings into the "New RPC URL" field.

- Click "Save" to connect Metamask to your Ganache environment.

3. Import Ganache Accounts into Metamask:

- In Ganache, you have a list of accounts with private keys. You can import these accounts into Metamask for testing purposes.

- In Metamask, go to "Import Account" and provide the private key of an account from Ganache.

- Repeat this process for each account you want to use in Metamask.

4. Compile and Deploy Smart Contracts in Remix:

- Open the Remix IDE in your browser.

- Write or import your smart contract code.

- Compile the smart contract in Remix.

5. Connect Remix to Ganache:

- In Remix, under the "Run" tab, select "Environment" and choose "Web3 Provider."

- Enter the Web3 Provider endpoint from your Ganache workspace settings.

6. Deploy Smart Contracts from Remix

- In Remix, select the contract you want to deploy.
- Click the "Deploy" button.
- Confirm the deployment in Metamask when prompted.

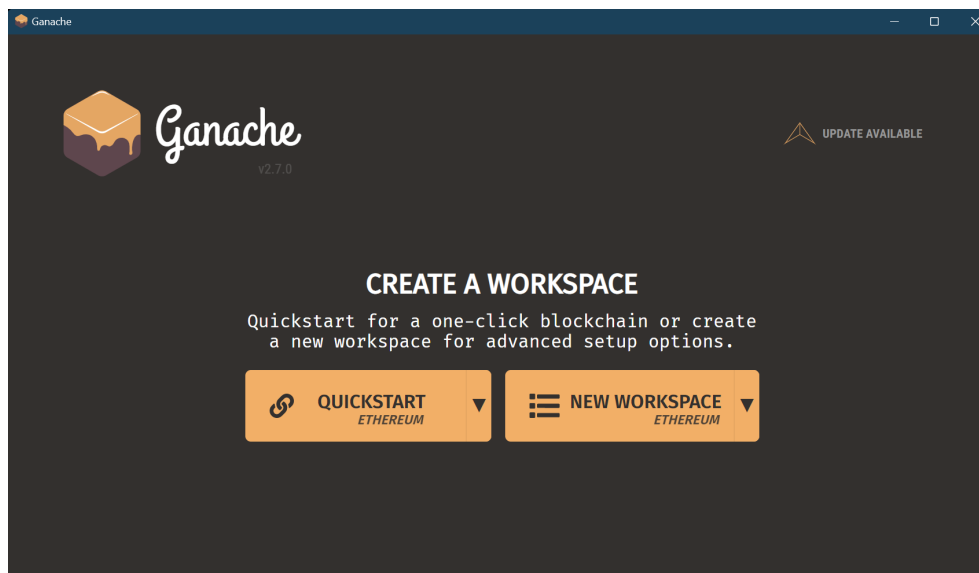
7. Perform Transactions

- Once your smart contract is deployed, you can interact with it through Remix.
- Use Metamask to confirm and sign transactions when executing functions on the smart contract.

These steps will allow you to set up a development environment with Ganache, connect it to Metamask, and use Remix IDE for smart contract development and testing on the Ethereum blockchain.

Program:

Installed Ganache Successfully



Click on QuickStart

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

UPDATE AVAILABLE

CURRENT BLOCK0

GAS PRICE20000000000

GAS LIMIT6721975

HARDFORKMERGE

NETWORK ID5777

RPC SERVERHTTP://127.0.0.1:7545

MINING STATUSAUTOMINING

WORKSPACE QUICKSTART

SAVE

SWITCH

MNEMONIC

lens live world vacuum barrel close upon mesh bonus cradle trust fetch

HD PATH

m44'60'0'0account_index

ADDRESS	BALANCE	TX COUNT	INDEX	
0x4E616F970F4690F3dACa196777dcC9144Ca84192	100.00 ETH	0	0	
ADDRESS	BALANCE	TX COUNT	INDEX	
0x42833A5fD9F785a1E5Fe965168fa53c6717A014E	100.00 ETH	0	1	
ADDRESS	BALANCE	TX COUNT	INDEX	
0x6D5F976f22FED5Cc25c894774FfB255A9579C5c3	100.00 ETH	0	2	
ADDRESS	BALANCE	TX COUNT	INDEX	
0xF0cbECCD37C84B0801c37E9ECBaF74d9A409B210	100.00 ETH	0	3	
ADDRESS	BALANCE	TX COUNT	INDEX	
0xE06009e635bc7eAd782e96E56692f63FE8CABCDa	100.00 ETH	0	4	
ADDRESS	BALANCE	TX COUNT	INDEX	

Genesis Block created

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

UPDATE AVAILABLE

CURRENT BLOCK0

GAS PRICE20000000000

GAS LIMIT6721975

HARDFORKMERGE

NETWORK ID5777

RPC SERVERHTTP://127.0.0.1:7545

MINING STATUSAUTOMINING

WORKSPACE QUICKSTART

SAVE

SWITCH

BLOCK

0

MINED ON

2023-10-12 19:44:25

GAS USED

0

NO TRANSACTIONS

Contents of block 0

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

UPDATE AVAILABLE

SEARCH FOR BLOCK NUMBERS

CURRENT BLOCK

0

GAS PRICE

20000000000

GAS LIMIT

6721975

HARDFORK

MERGE

NETWORK ID

5777

RPC SERVER

HTTP://127.0.0.1:7545

MINING STATUS

AUTOMINING

WORKSPACE QUICKSTART

SAVE

SWITCH

← BACK

BLOCK 0

GAS USED	GAS LIMIT	MINED ON	BLOCK HASH
0	6721975	2023-10-12 19:44:25	0x59244d236e95e5a8bd6851b0d9eb83c0880fe8e008ed878a5079f94656e3d3c8

NO TRANSACTIONS

Log

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

UPDATE AVAILABLE

SEARCH FOR BLOCK NUMBERS

CURRENT BLOCK

0

GAS PRICE

20000000000

GAS LIMIT

6721975

HARDFORK

MERGE

NETWORK ID

5777

RPC SERVER

HTTP://127.0.0.1:7545

MINING STATUS

AUTOMINING

WORKSPACE QUICKSTART

SAVE

SWITCH

CLEAR LOGS

[7:44:27 PM] eth_getTransactionCount

[7:44:27 PM] eth_subscribe

[7:44:27 PM] eth_getLogs

[7:44:27 PM] eth_subscribe

[7:44:27 PM] eth_getBalance

[7:44:27 PM] eth_getTransactionCount

[7:44:27 PM] eth_getBalance

[7:44:27 PM] eth_getTransactionCount

[7:44:27 PM] eth_getBalance

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[7:44:27 PM] eth_getBalance

[7:44:27 PM] eth_getTransactionCount

[7:44:27 PM] eth_getBalance

[7:44:27 PM] eth_getTransactionCount

[7:44:27 PM] eth_getBlockByNumber

[7:45:10 PM] eth_getBlockTransactionCountByHash

[7:45:10 PM] eth_getBlockByNumber

[7:45:55 PM]

Login to Metamask Wallet

Add Ganache Test Network with the following credentials

Network Name : Ganache

New RPC URL : HTTP://127.0.0.1:7545

Chain ID : 1337

Currency Symbol : ETH

MetaMask | chrome-extension://nkbihfbeogaeaoehlefnkodbefgpgknn/home.html#/settings/networks/add-network

Advanced

Contacts

Snaps

Security & privacy

Alerts

Networks

Experimental

About

Network name

Ganache

New RPC URL

HTTP://127.0.0.1:7545/

Chain ID

1337

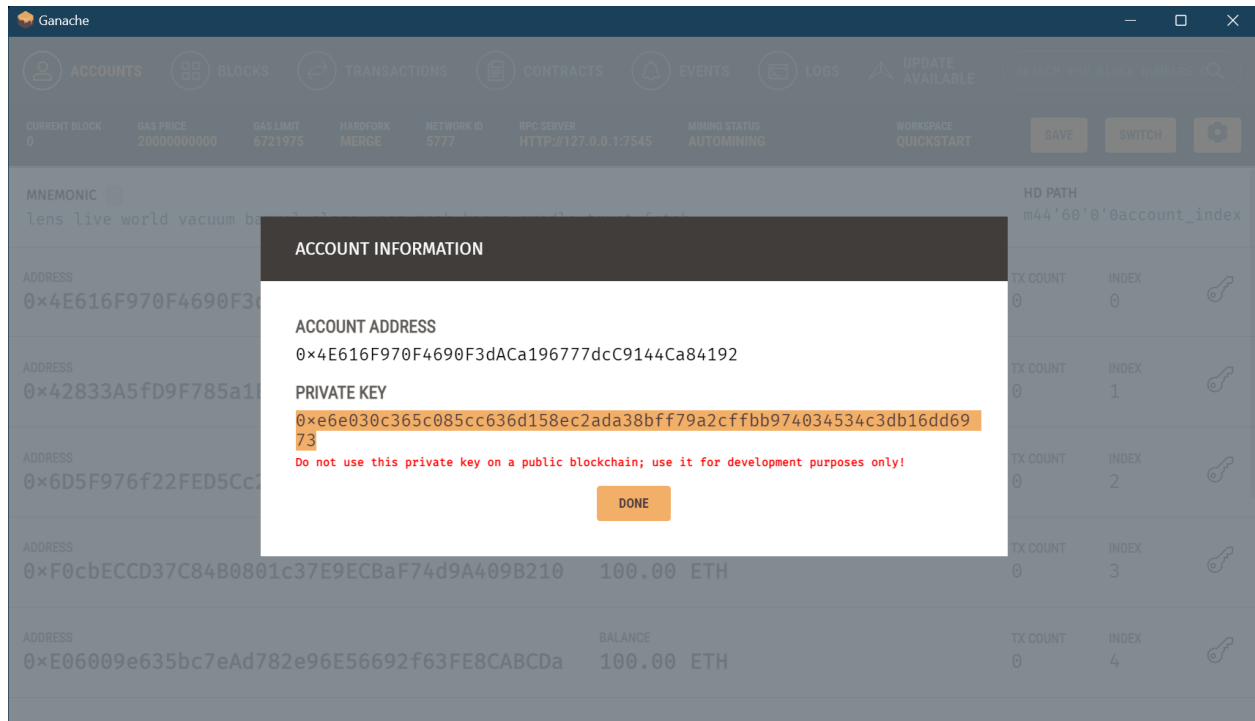
Currency symbol

ETH

Block explorer URL (Optional)

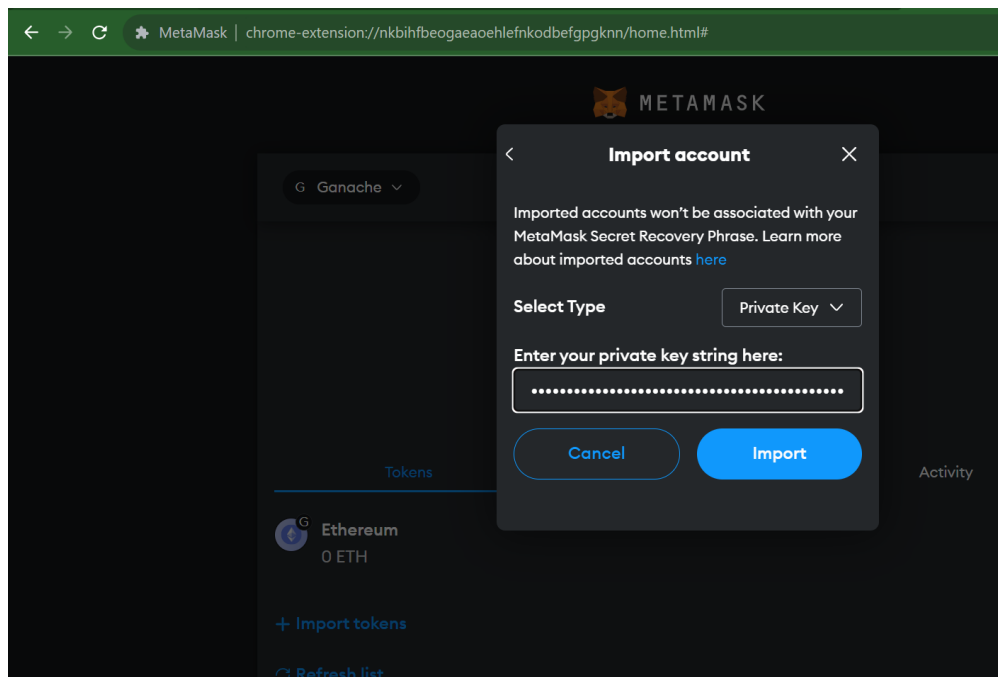
Cancel Save

Open the Ganache IDE, click on the private key for any account. Copy the Private Key

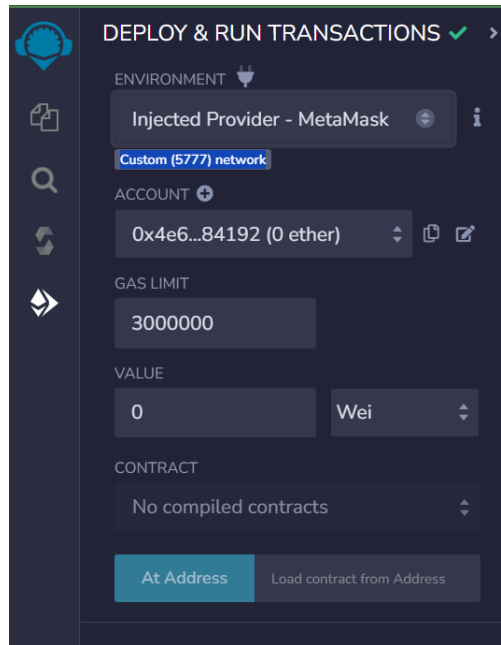
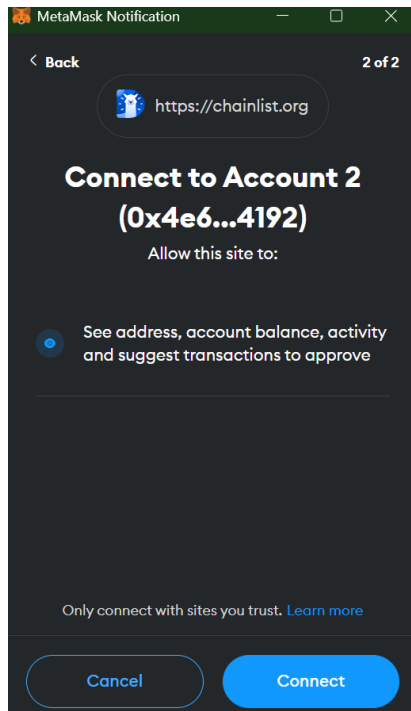


Go to Matamask, select Import Account option.

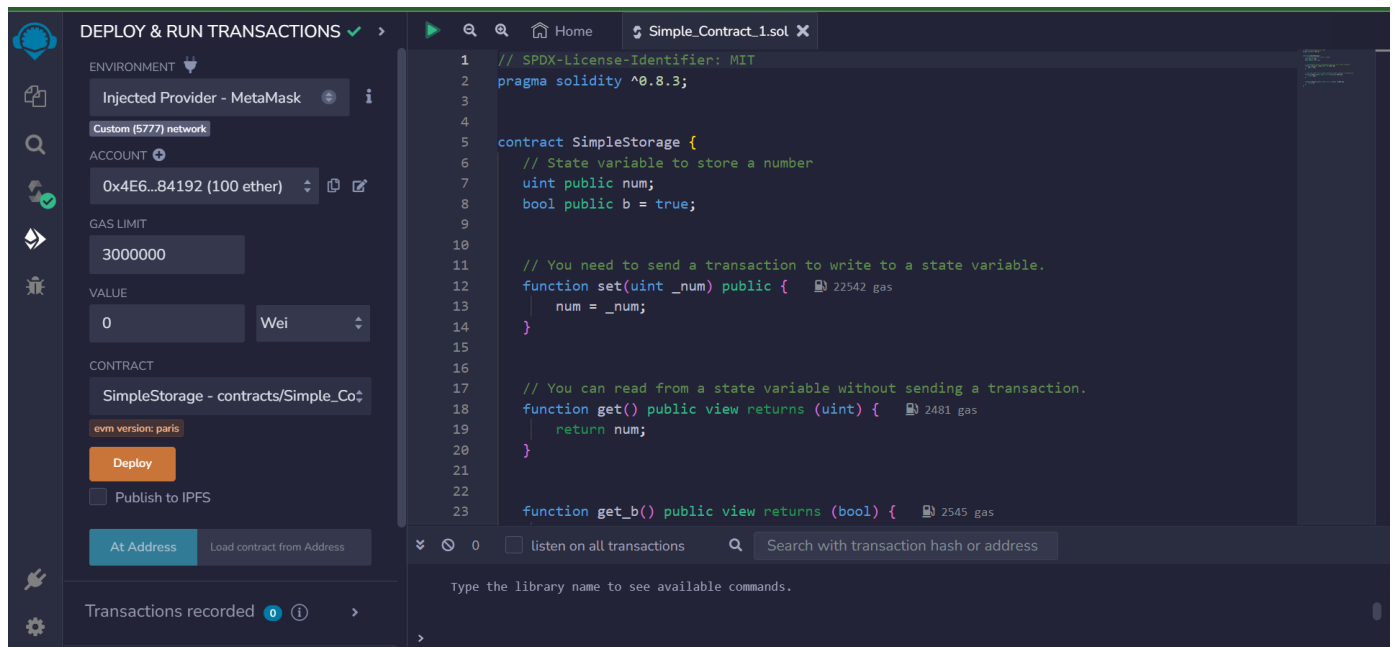
Paste the Private Key of the Account. Click on Import button

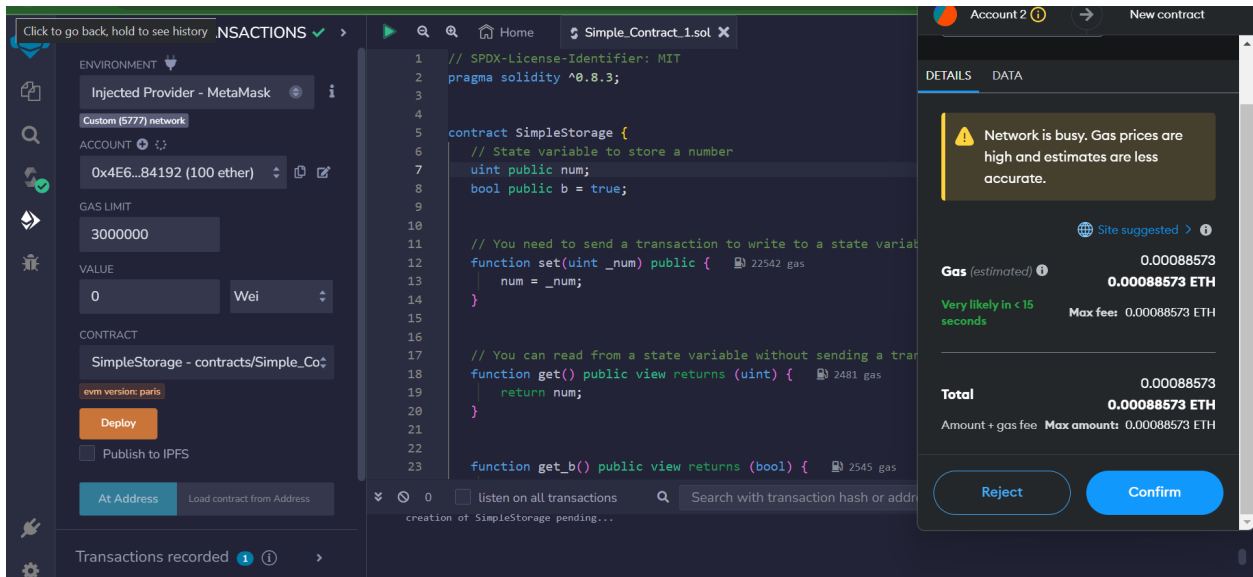


On the Remix IDE, select the Environment : Injected Provider(Metamask) . Follow the steps to establish Connection. Select an Account from the Wallet

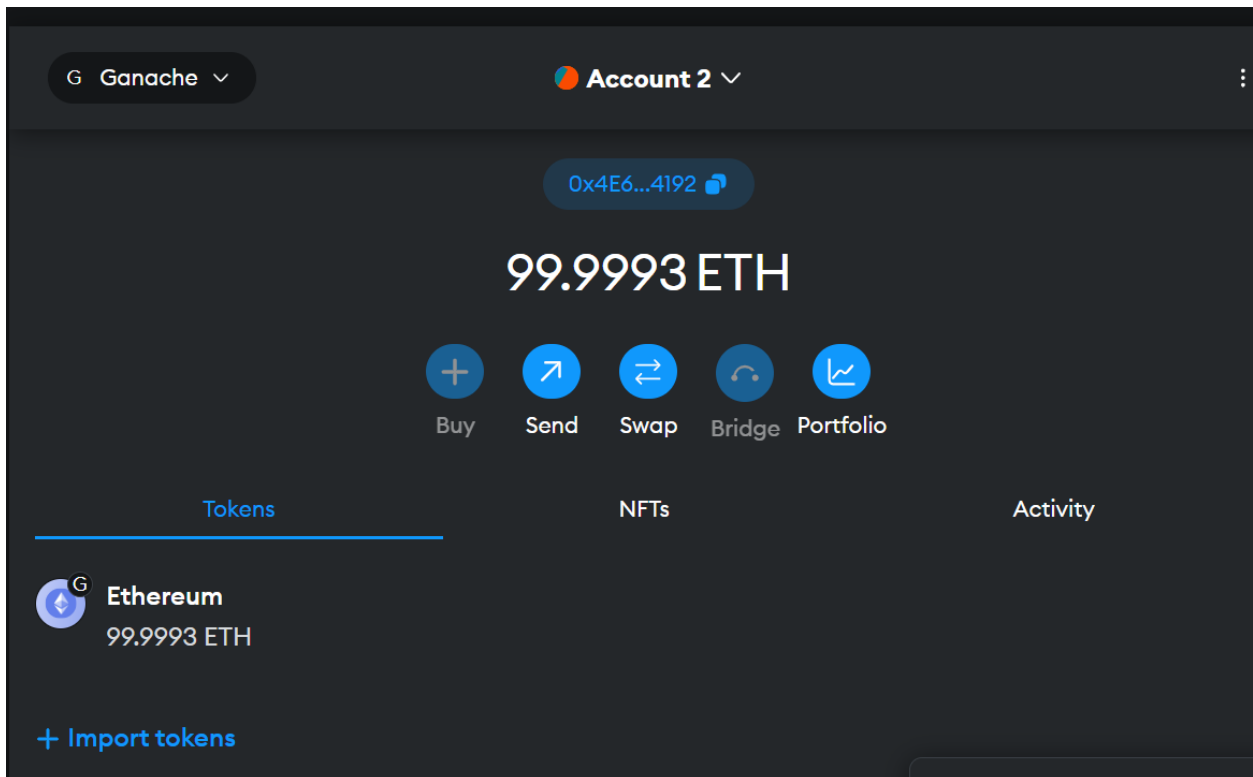


After compiling the Smart Contract in Remix IDE, deploy the Contract





Metamask Account status is updated



Check the Ganache Environment. We can see that the Transaction Count for the first account is 1

Ganache

ACCOUNTS BLOCKS TRANSACTIONS CONTRACTS EVENTS LOGS UPDATE AVAILABLE SEARCH FOR BLOCK NUMBERS

CURRENT BLOCK 1 GAS PRICE 20000000000 GAS LIMIT 6721975 HARDFORK MERGE NETWORK ID 5777 RPC SERVER HTTP://127.0.0.1:7545 MINING STATUS AUTOMINING WORKSPACE QUICKSTART SAVE SWITCH

MNEMONIC ? lens live world vacuum barrel close upon mesh bonus cradle trust fetch **HD PATH** m44'60'0'0account_index

ADDRESS	BALANCE	TX COUNT	INDEX	
0x4E616F970F4690F3dACa196777dcC9144Ca84192	100.00 ETH	1	0	
0x42833A5fD9F785a1E5Fe965168fa53c6717A014E	100.00 ETH	0	1	
0x6D5F976f22FED5Cc25c894774FfB255A9579C5c3	100.00 ETH	0	2	
0xF0cbECCD37C84B0801c37E9ECBaF74d9A409B210	100.00 ETH	0	3	
ADDRESS	BALANCE	TX COUNT	INDEX	

Check the Mined Block

Ganache

ACCOUNTS BLOCKS TRANSACTIONS CONTRACTS EVENTS LOGS UPDATE AVAILABLE SEARCH FOR BLOCK NUMBERS

CURRENT BLOCK 1 GAS PRICE 20000000000 GAS LIMIT 6721975 HARDFORK MERGE NETWORK ID 5777 RPC SERVER HTTP://127.0.0.1:7545 MINING STATUS AUTOMINING WORKSPACE QUICKSTART SAVE SWITCH

BLOCK	MINED ON	GAS USED	
1	2023-10-12 20:34:43	196830	1 TRANSACTION
0	2023-10-12 19:44:25	0	NO TRANSACTIONS

Check the Transaction details in Ganache

The screenshot shows the Ganache desktop application interface. At the top, there is a navigation bar with icons for ACCOUNTS, BLOCKS, TRANSACTIONS, CONTRACTS, EVENTS, LOGS, and an UPDATE AVAILABLE notification. Below this is a status bar displaying various network metrics: CURRENT BLOCK 1, GAS PRICE 20000000000, GAS LIMIT 6721975, HARDFORK MERGE, NETWORK ID 5777, RPC SERVER HTTP://127.0.0.1:7545, MINING STATUS AUTOMINING, and WORKSPACE QUICKSTART. There are also buttons for SAVE, SWITCH, and a settings icon.

The main content area is titled "BLOCK 1" with a "← BACK" button. It displays the following transaction details:

GAS USED	GAS LIMIT	MINED ON	BLOCK HASH
196830	6721975	2023-10-12 20:34:43	0x9565e41f67bc97d8fa7a2b1917965b0c3a74c5e8cacdda746cebc26c2d8094ff

Below the block details, the transaction details are shown:

TX HASH	FROM ADDRESS	CREATED CONTRACT ADDRESS	GAS USED	VALUE
0xc15cc41e476a15c0e1a274a340ee2402557869496af5a604c5de4f96f92436c6	0x4E616F970F4690F3dACa196777dcC9144Ca84192	0x5fED18e56dBf6fC93d820E506D7Ec14897C30500	196830	0

A "CONTRACT CREATION" button is visible next to the TX HASH.

Conclusion: our experiment implementing the Blockchain platform Ganache proved to be a valuable exercise in understanding the fundamentals of blockchain technology. We successfully set up a local development environment and gained insights into smart contract deployment and interaction.