Final Project: Blockchain Technologies-1

Group members: Zarina Kerimbay

Akbota Bekturgan

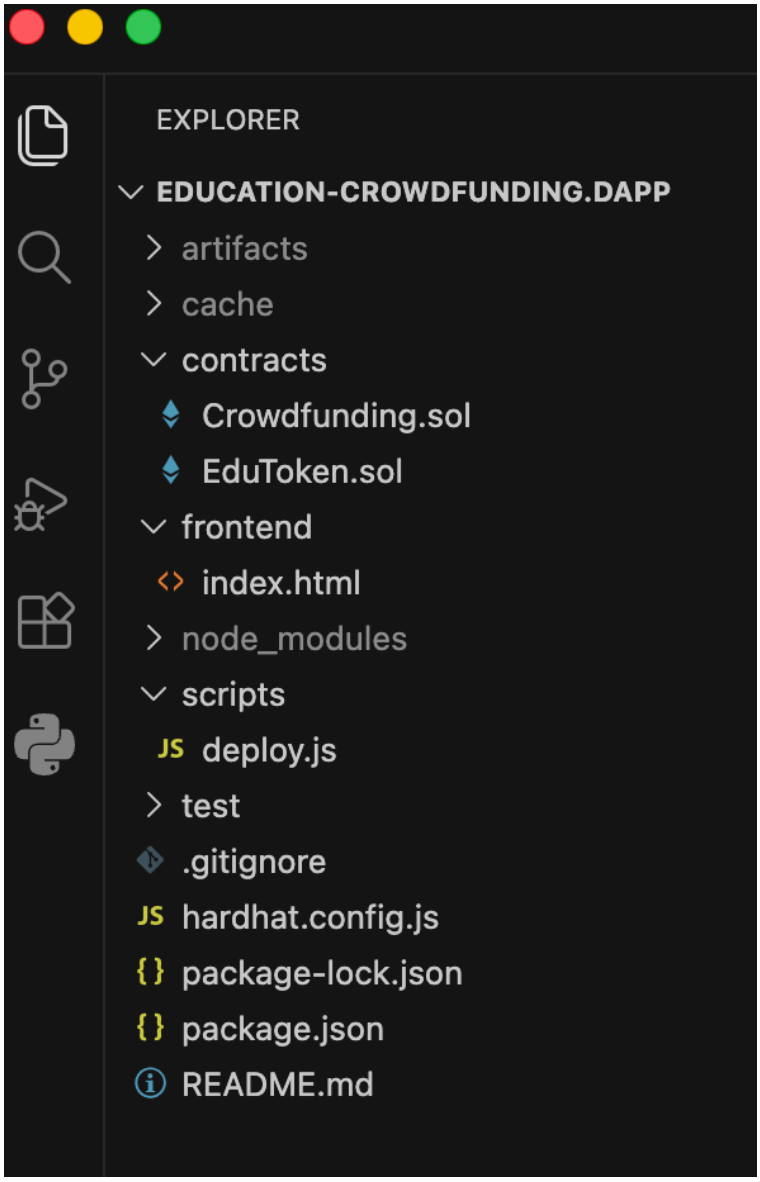
Rustam Saduakas

https://github.com/bekturganakbota70-blip/education-crowdfunding.dapp.git

Overview of Application Architecture

This section explains how the components of your system interact. A typical DApp follows a **Three-Tier Architecture**:

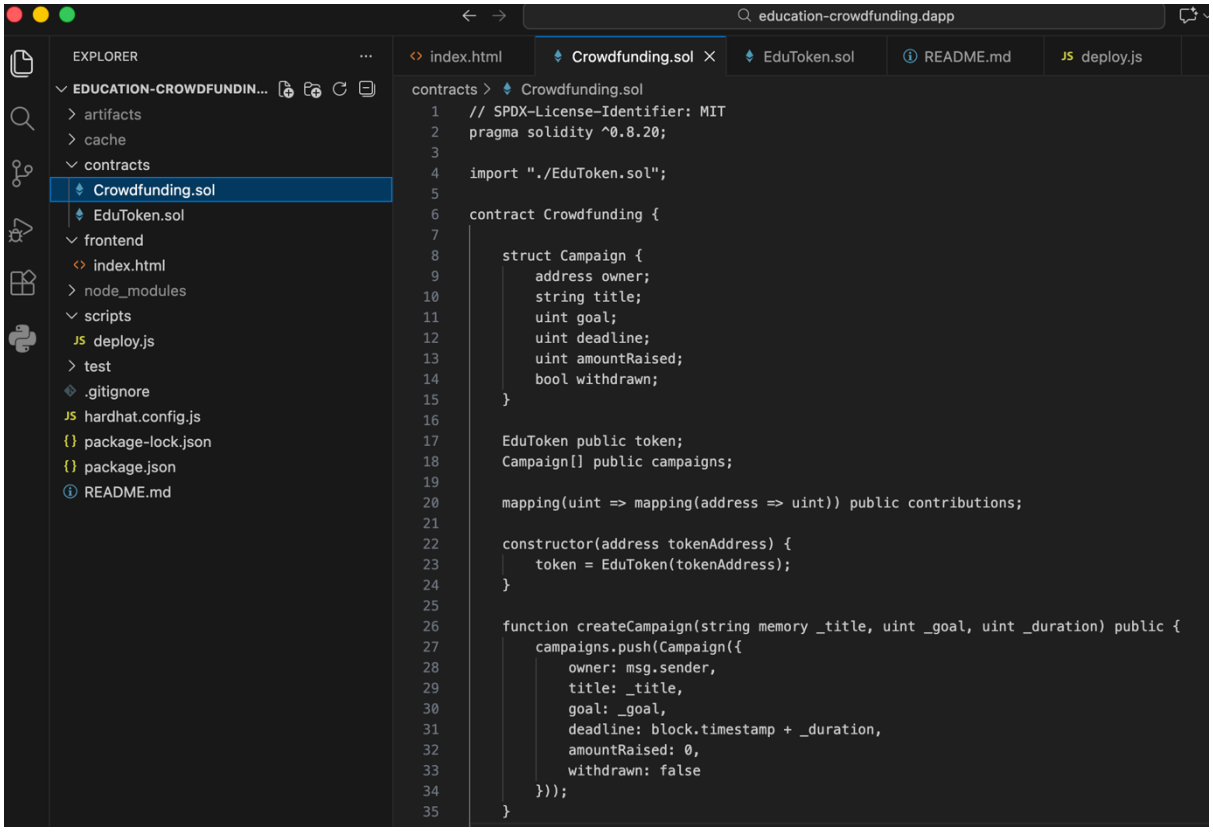
- **Frontend (The Client):** Built with frameworks like React, Vue, or Next.js. It handles the UI and user input.
- **Provider/Wallet (The Bridge):** Tools like MetaMask or WalletConnect act as the signer and the gateway to the blockchain.
- **Smart Contracts (The Backend):** Written in Solidity (or similar) and deployed on a blockchain (e.g., Ethereum Sepolia). This serves as your "immutable database" and logic layer.

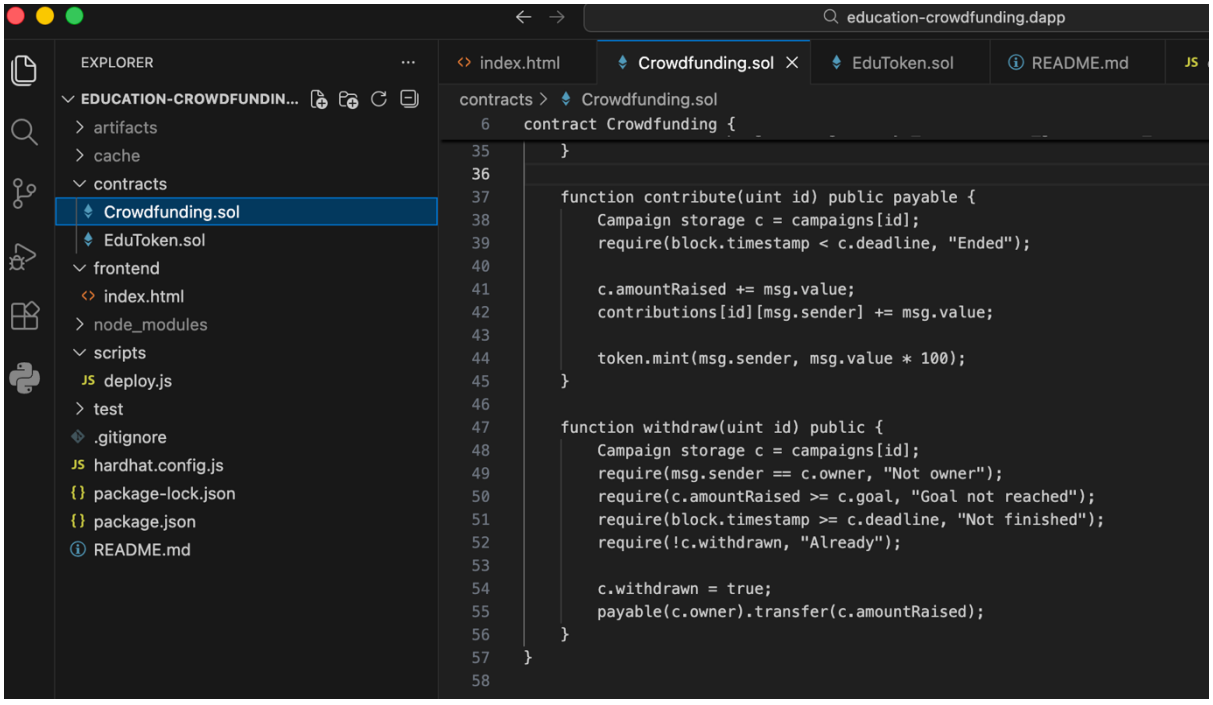


Design and Implementation Decisions

The system was designed with the following considerations:

- Core logic is implemented in **smart contracts** to ensure transparency and immutability.
- The contracts are kept **modular and minimal** to reduce gas costs.
- A **test network** is used instead of Ethereum mainnet to allow safe testing.
- MetaMask was selected for wallet integration due to its wide adoption and ease of use.
- The frontend does not store sensitive data; all critical data is retrieved directly from the blockchain.



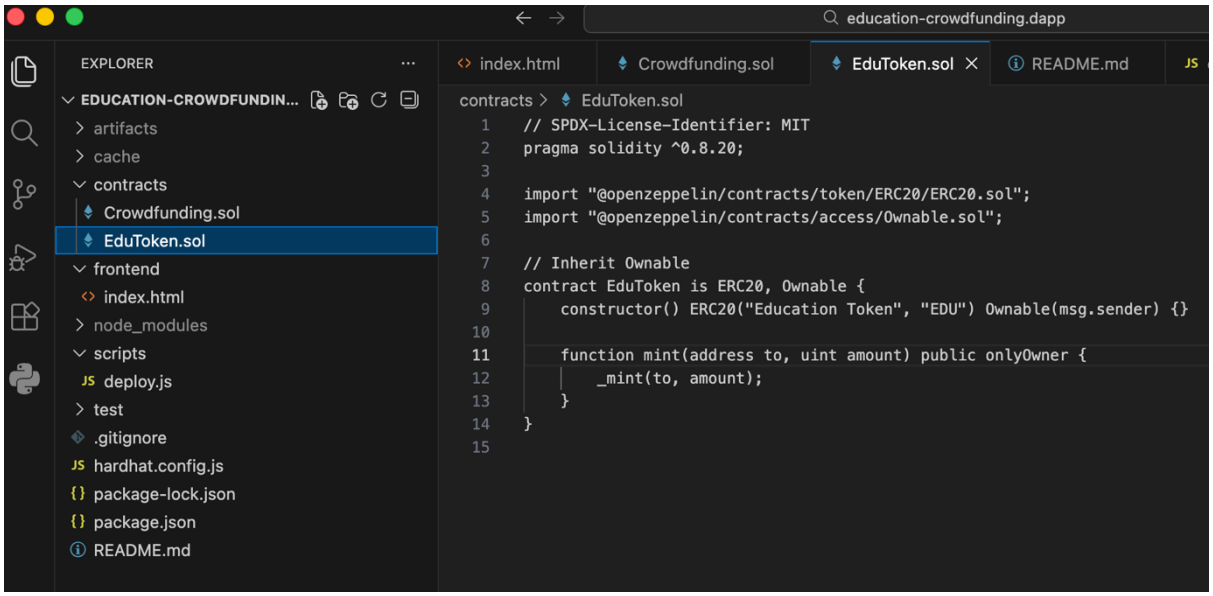


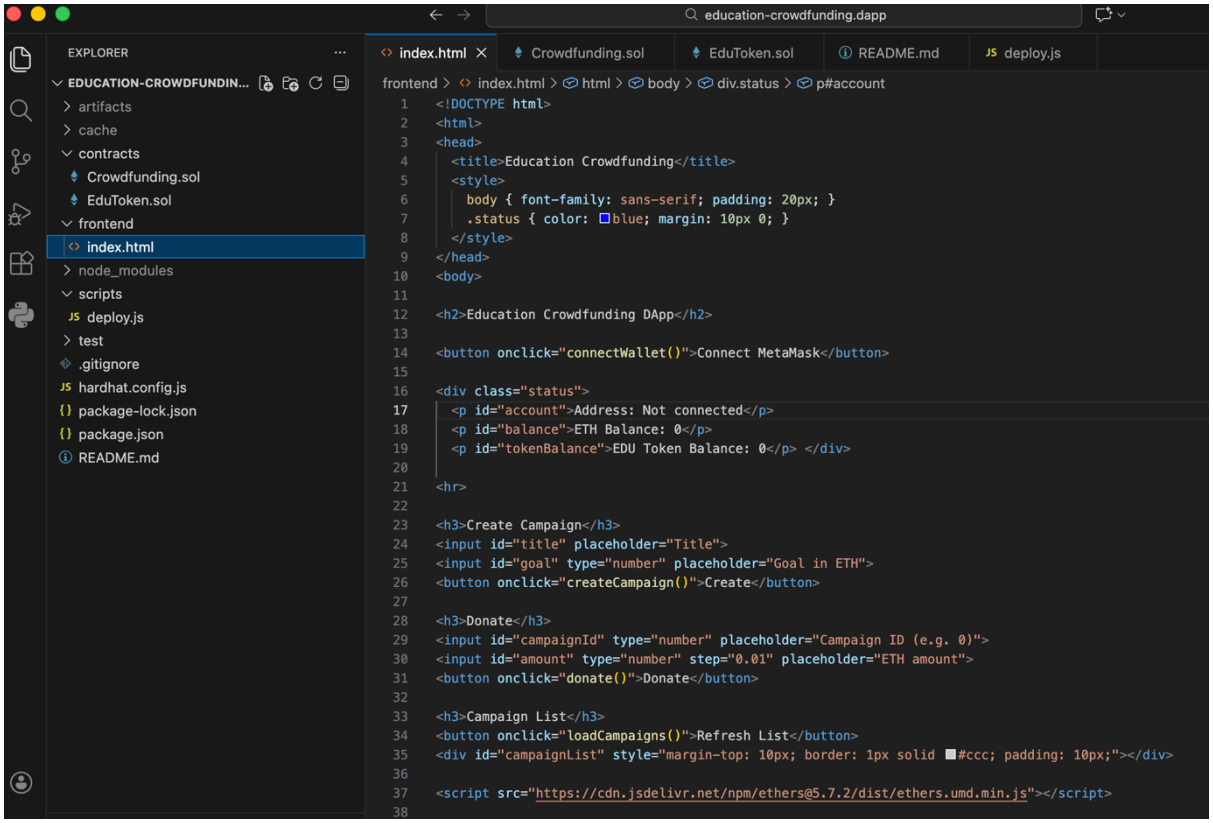
Description of Smart Contract Logic

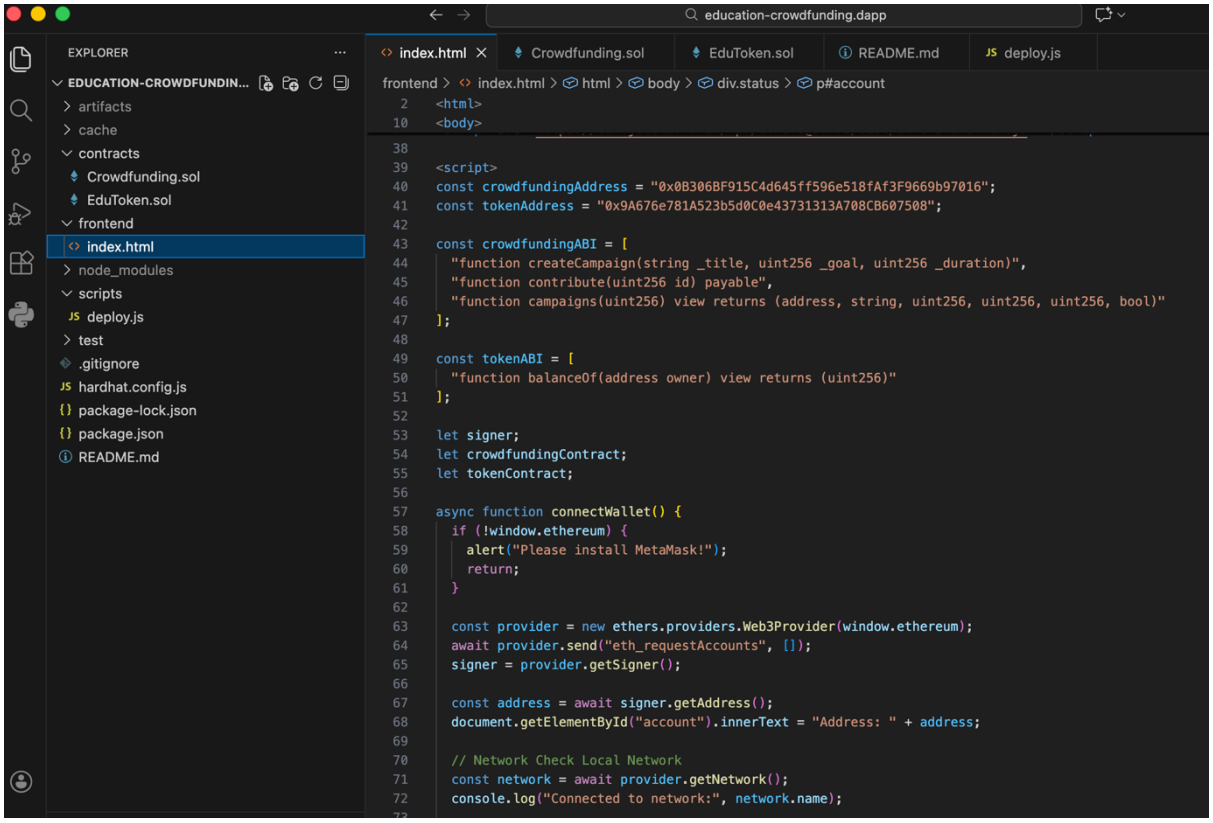
The smart contract defines:

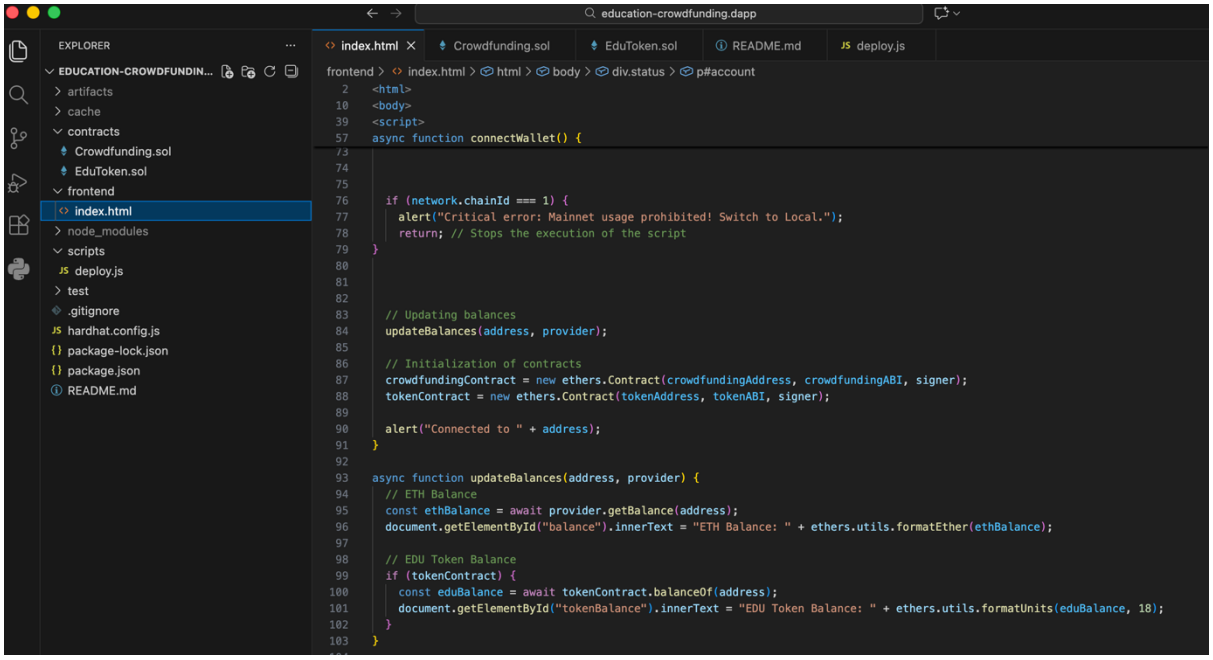
- State variables to store application data.

- Functions that allow users to interact with the contract, such as creating records, updating state, or transferring value.
- Validation logic using `require()` statements to prevent invalid transactions.
- Access control mechanisms where necessary.
- Events that are emitted after successful state changes to notify the frontend.







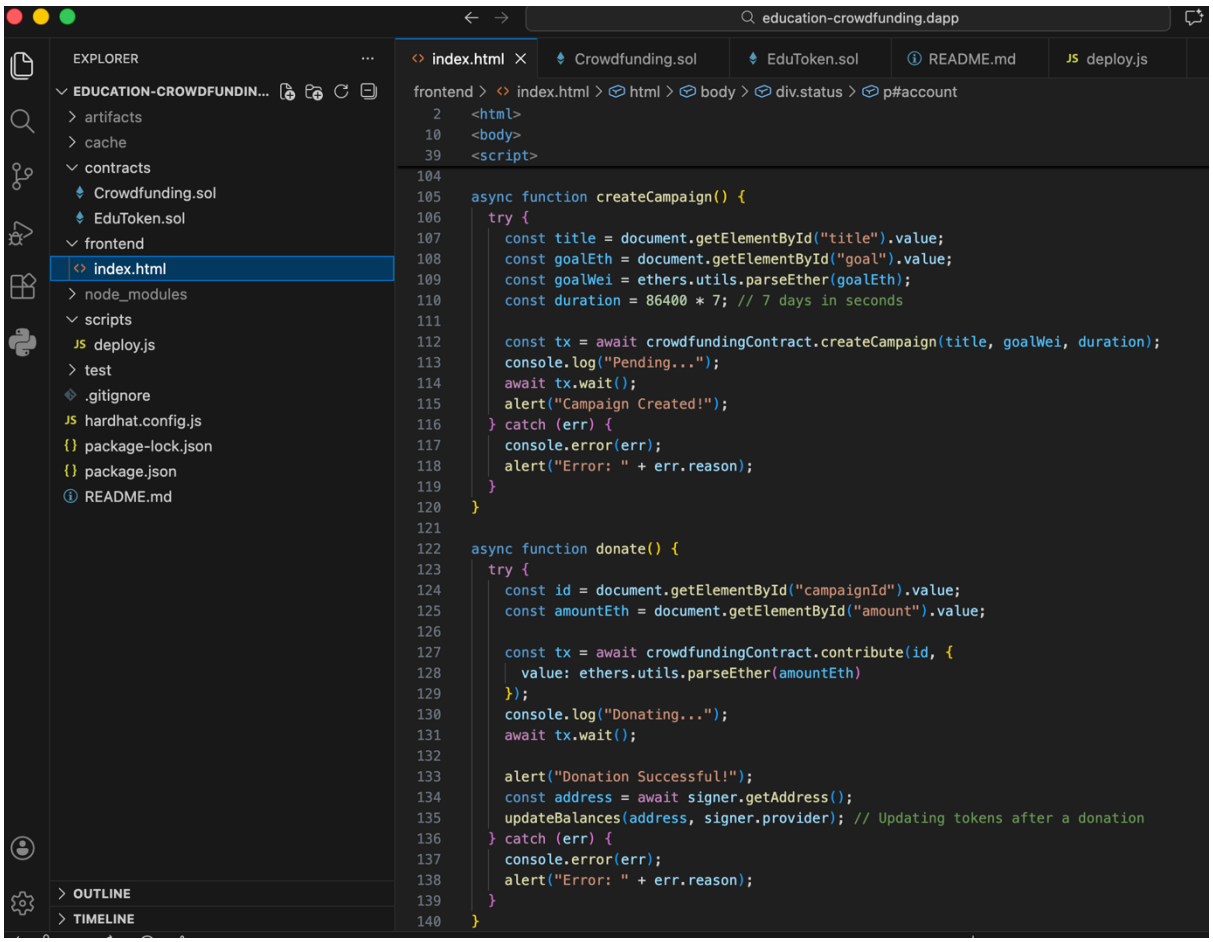


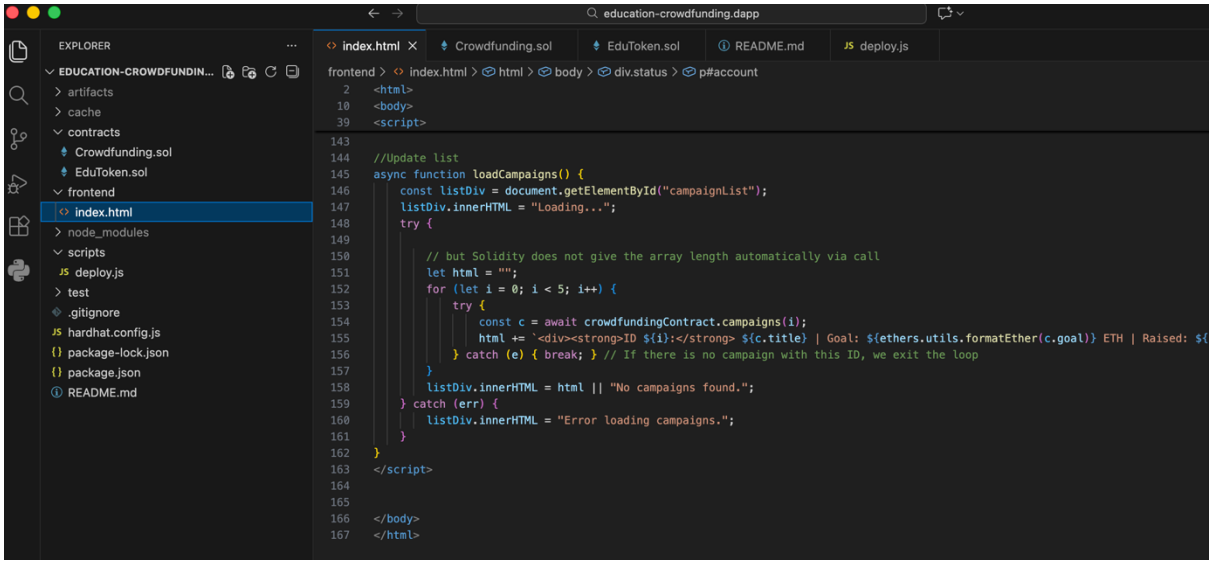
Frontend-to-Blockchain Interaction

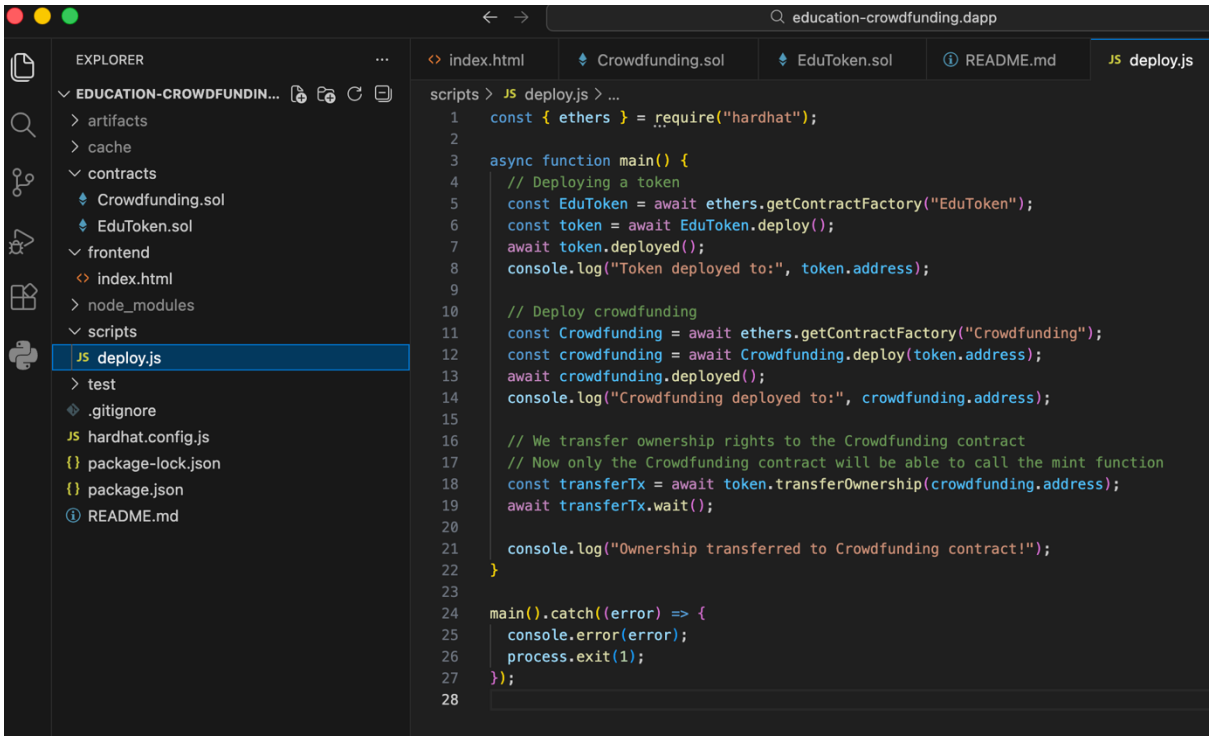
The interaction process is as follows:

1. The user connects their wallet via MetaMask.
2. The frontend retrieves the user's Ethereum account.

3. A contract instance is created using the contract's ABI and deployed address.
4. Read-only data is fetched directly from the blockchain.
5. State-changing functions require user confirmation and gas fees.
6. Transaction results are displayed in the user interface.







Deployment and Execution Instructions

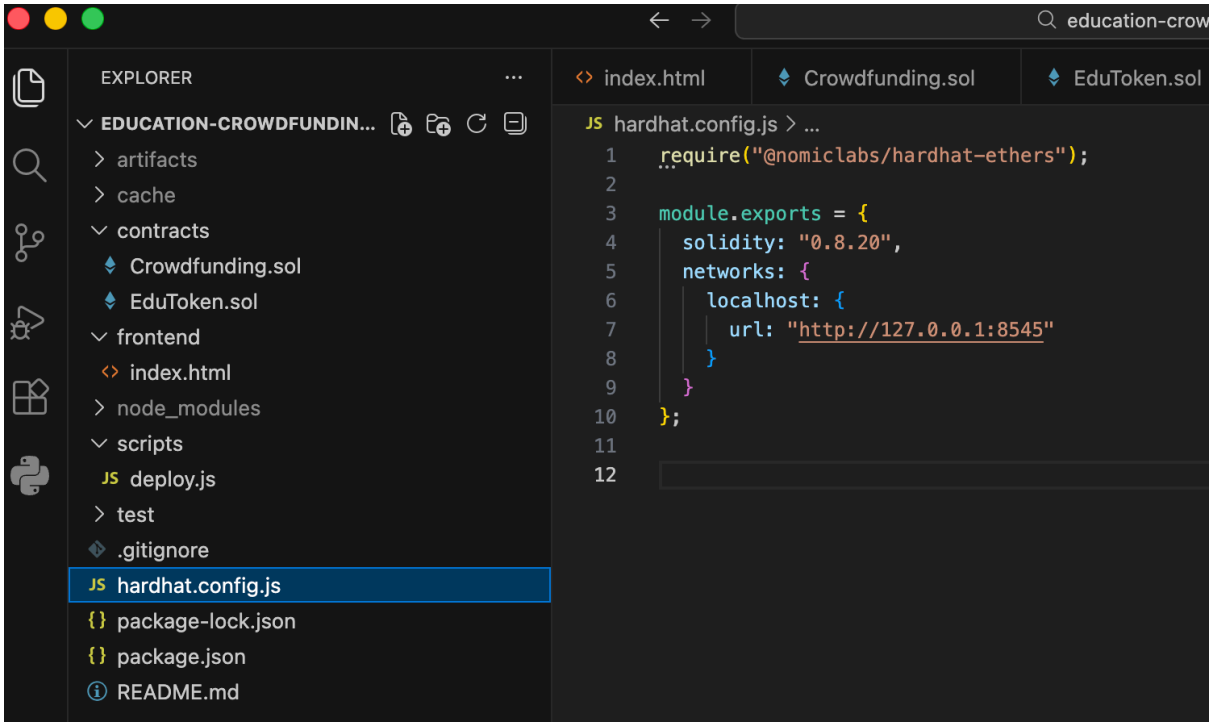
Smart Contract Deployment

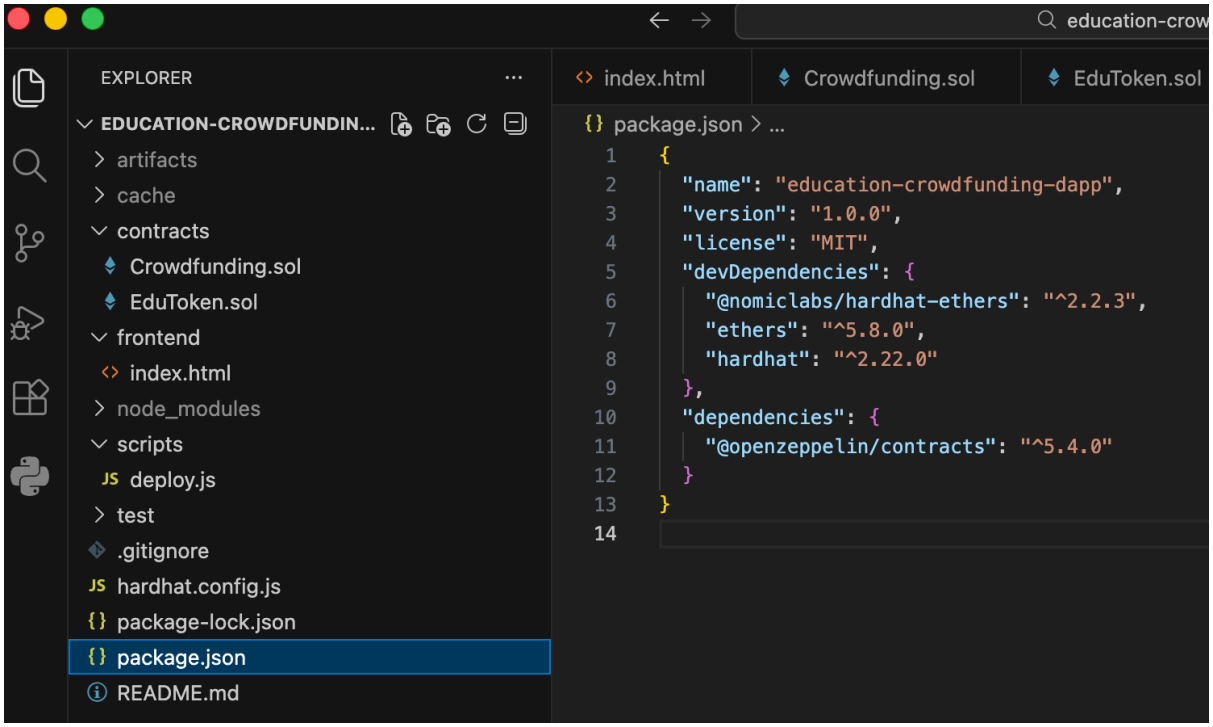
1. Install dependencies:
2. `npm install`
3. Compile smart contracts:
4. `npx hardhat compile`
5. Deploy contracts to a test network:

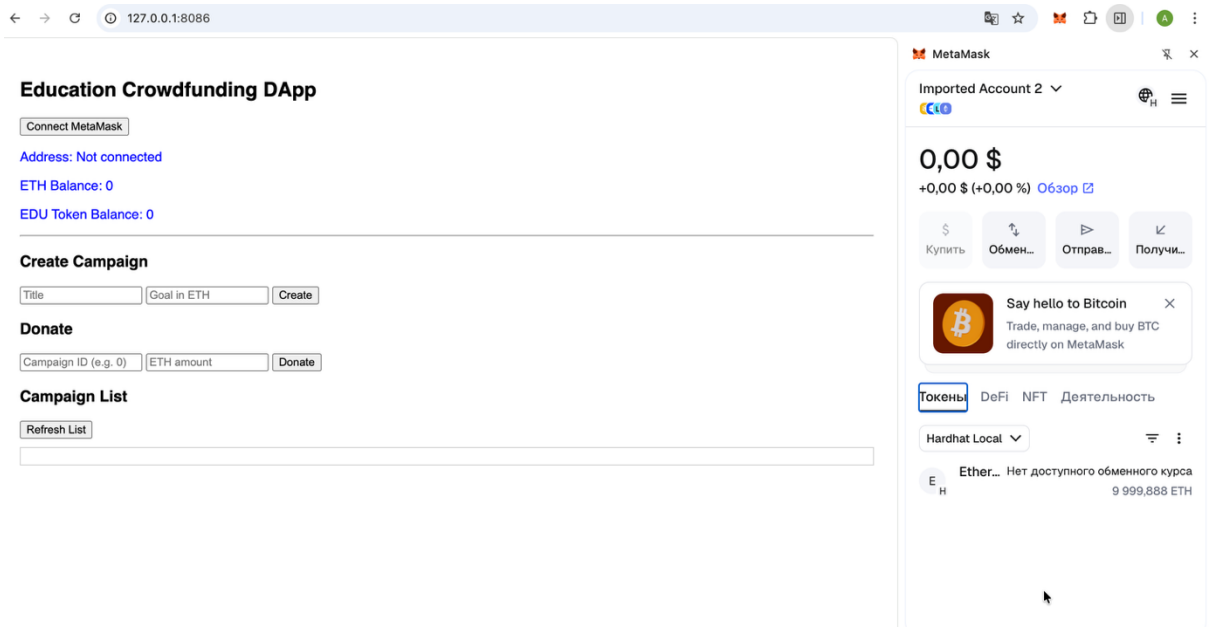
```
npx hardhat run scripts/deploy.js --network sepolia
```

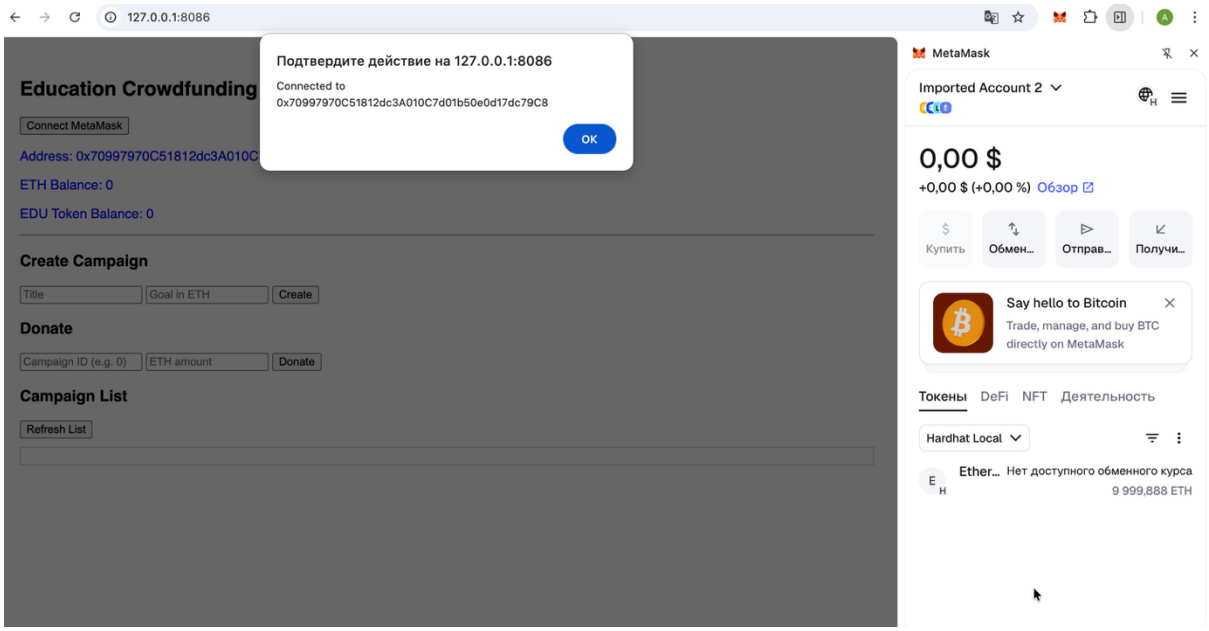
Frontend Execution

1. Navigate to the frontend directory.
2. Install dependencies:
3. `npm install`
4. Start the development server:
5. `npm run dev`
6. Open the application in a browser and connect MetaMask.


education-crow
EXPLORER
EDUCATION-CROWDFUNDIN...
artifacts
cache
contracts
Crowdfunding.sol
EduToken.sol
frontend
index.html
node_modules
scripts
deploy.js
test
.gitignore
hardhat.config.js
package-lock.json
package.json
README.md
index.html
Crowdfunding.sol
EduToken.sol
hardhat.config.js > ...
require("@nomiclabs/hardhat-ethers");
module.exports = {
solidity: "0.8.20",
networks: {
localhost: {
url: "http://127.0.0.1:8545"
}
}
};


education-crow
EXPLORER
EDUCATION-CROWDFUNDIN...
artifacts
cache
contracts
Crowdfunding.sol
EduToken.sol
frontend
index.html
node_modules
scripts
deploy.js
test
.gitignore
hardhat.config.js
package-lock.json
package.json
README.md
index.html
Crowdfunding.sol
EduToken.sol
package.json > ...
{
"name": "education-crowdfunding-dapp",
"version": "1.0.0",
"license": "MIT",
"devDependencies": {
"@nomiclabs/hardhat-ethers": "^2.2.3",
"ethers": "^5.8.0",
"hardhat": "^2.22.0"
},
"dependencies": {
"@openzeppelin/contracts": "^5.4.0"
}
}

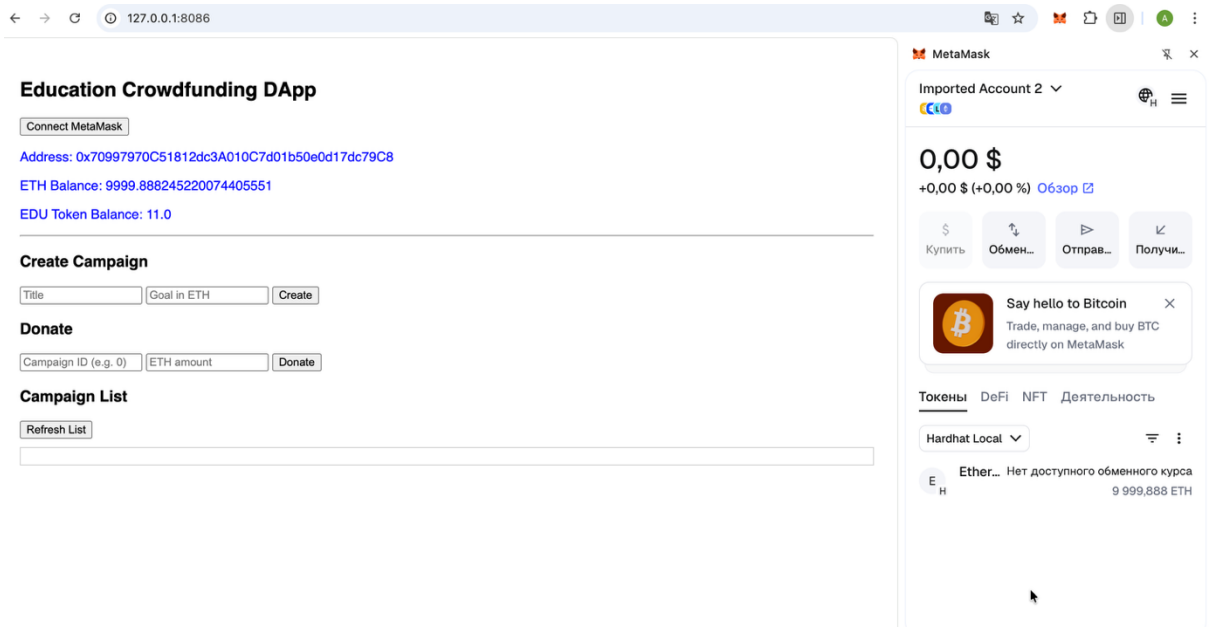


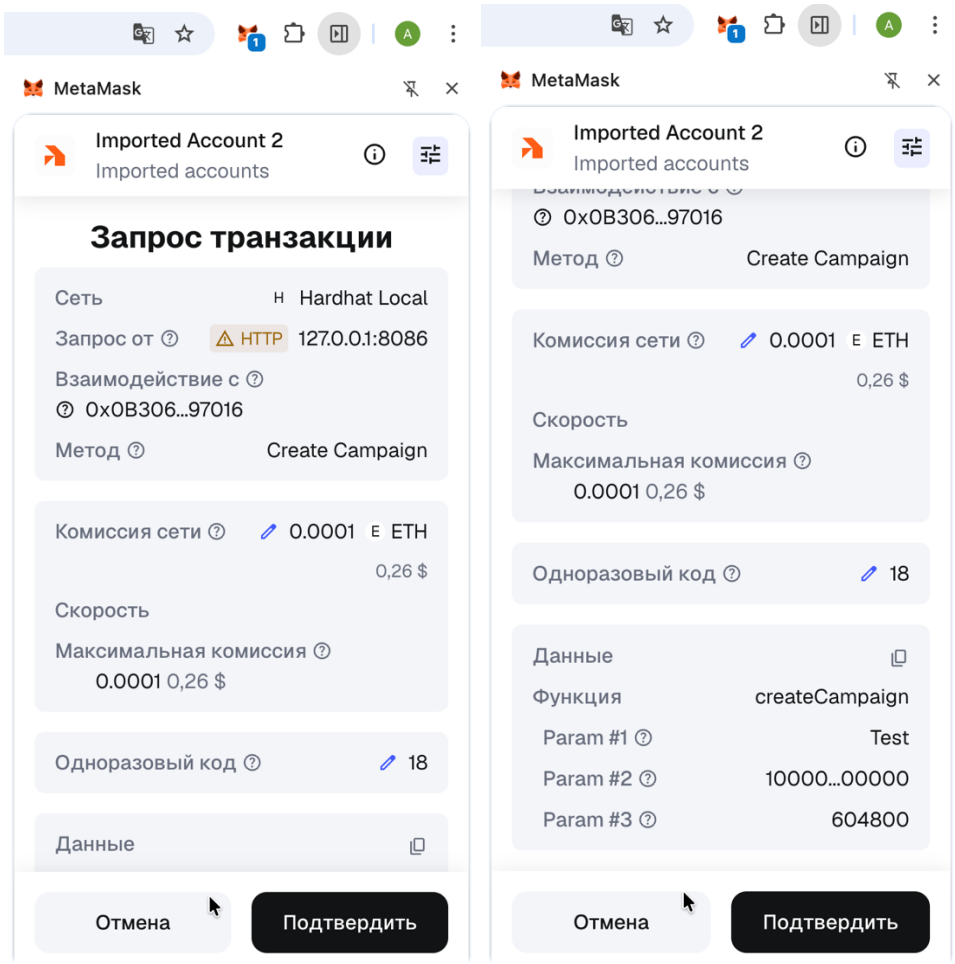


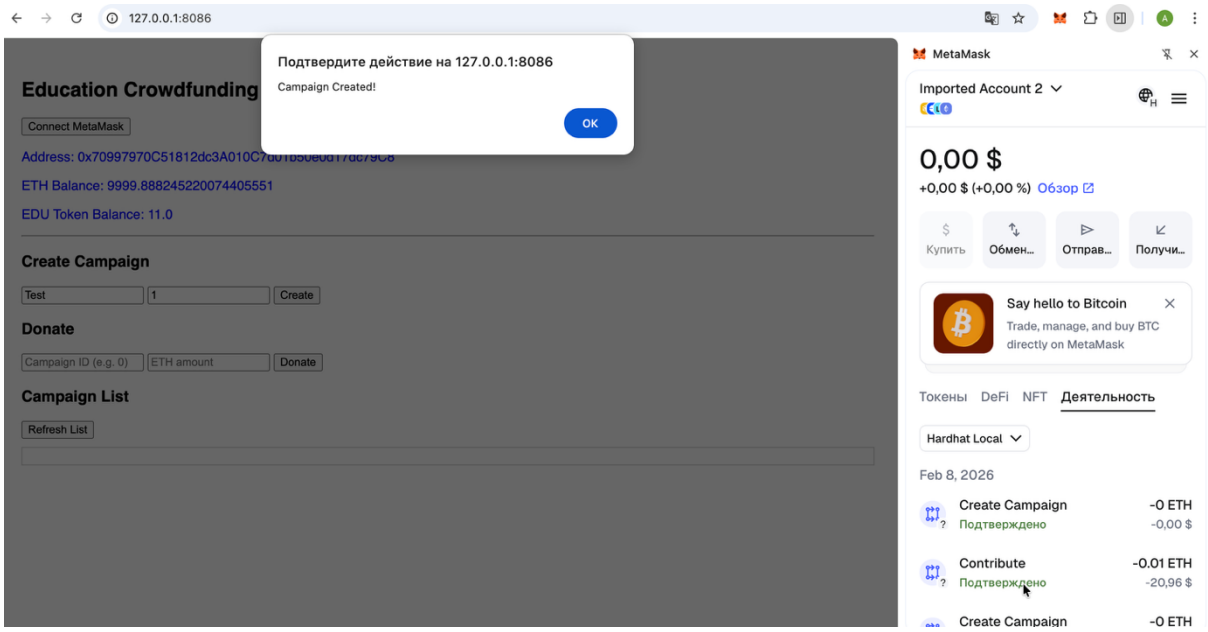
Process for Obtaining Test ETH

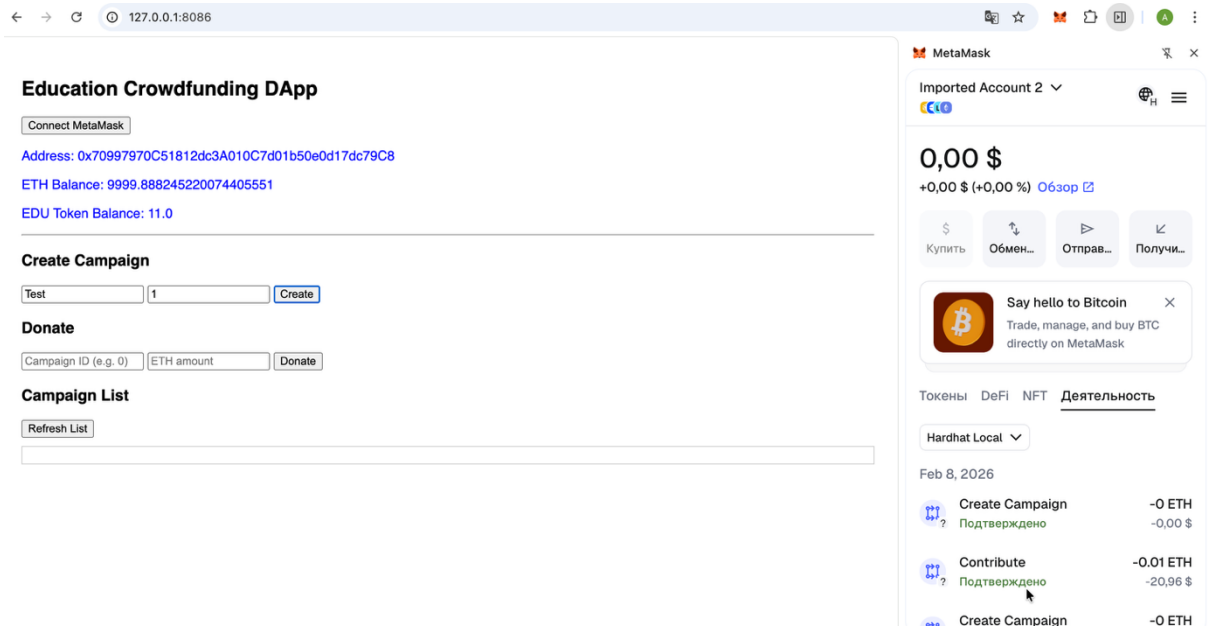
To obtain test ETH:

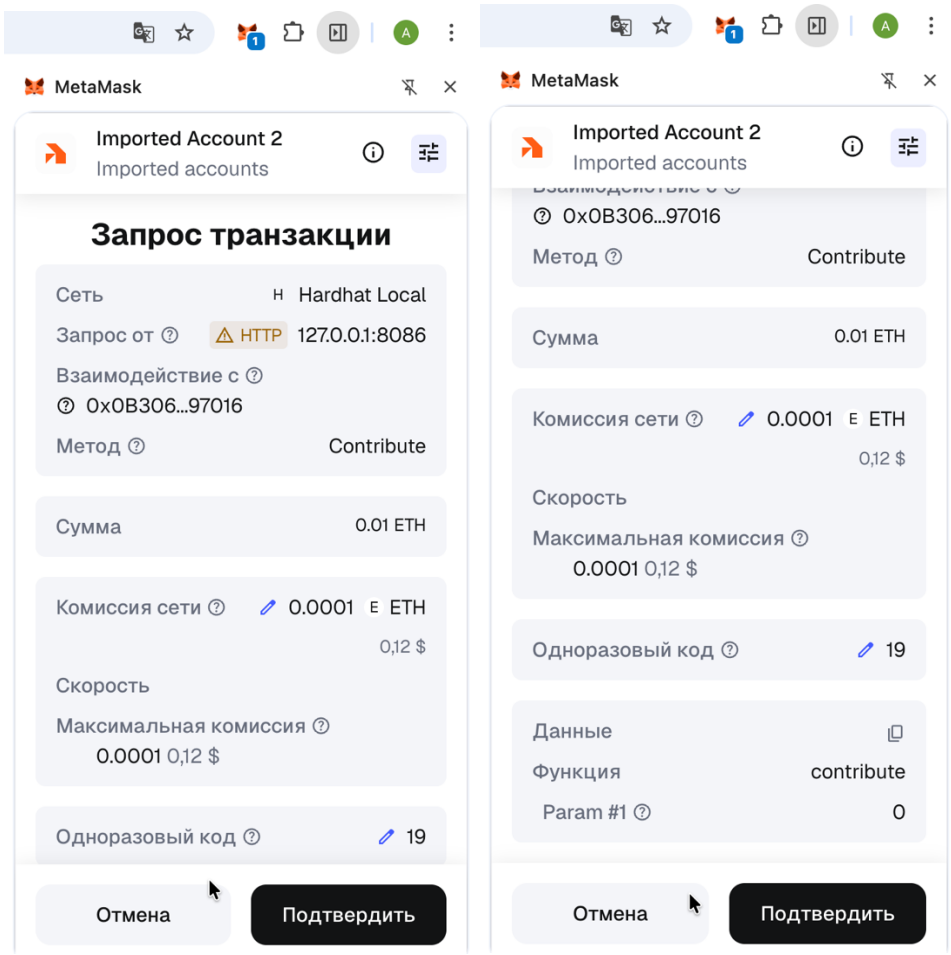
1. Install and set up MetaMask.
2. Switch the network to an Ethereum test network (e.g., Sepolia).
3. Visit a testnet faucet.
4. Enter the wallet address and request test ETH.
5. Once confirmed, the test ETH will appear in the wallet balance.

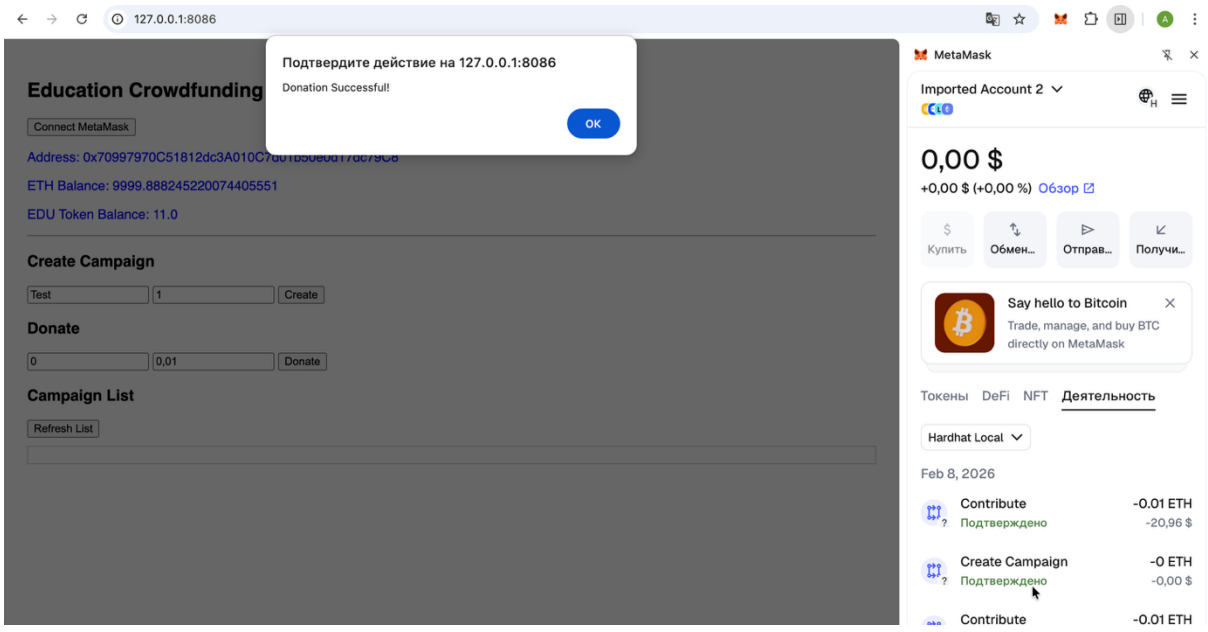

127.0.0.1:8086
Education Crowdfunding DApp
Connect MetaMask
Address: 0x70997970C51812dc3A010C7d01b50e0d17dc79C8
ETH Balance: 9999.888245220074405551
EDU Token Balance: 11.0
Create Campaign
Title
Goal in ETH
Create
Donate
Campaign ID (e.g. 0)
ETH amount
Donate
Campaign List
Refresh List
MetaMask
Imported Account 2
0,00 $
+0,00 $ (+0,00 %) Обзор
Купить
Обмен...
Отправ...
Получи...
Say hello to Bitcoin
Trade, manage, and buy BTC directly on MetaMask
Токены
DeFi
NFT
Деятельность
Hardhat Local
Ether... Нет доступного обменного курса
9 999,888 ETH

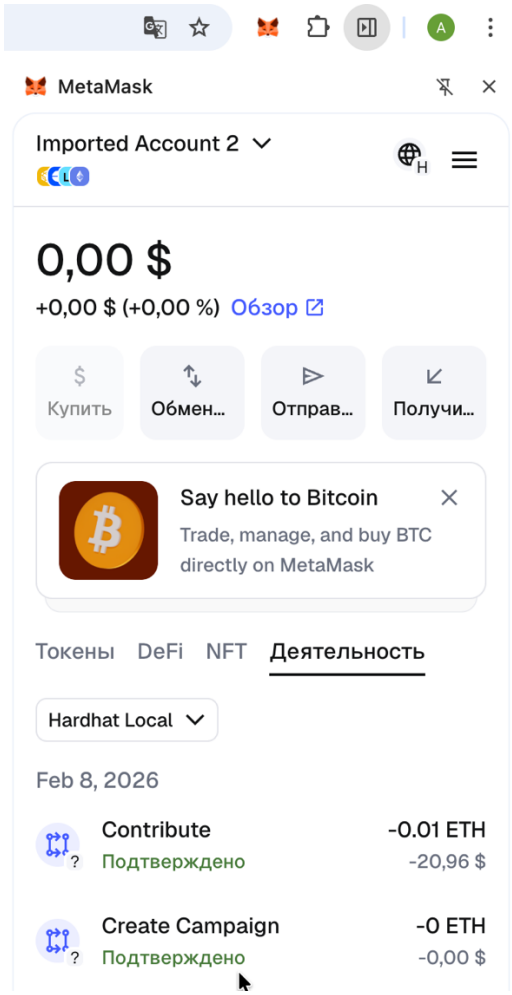

MetaMask
Imported Account 2
Imported accounts
Запрос транзакции
Сеть
Hardhat Local
Запрос от
HTTP
127.0.0.1:8086
Взаимодействие с
0x0B306...97016
Метод
Create Campaign
Комиссия сети
0.0001
ETH
0,26 $
Скорость
Максимальная комиссия
0.0001 0,26 $
Одноразовый код
18
Данные
Отмена
Подтвердить
MetaMask
Imported Account 2
Imported accounts
0x0B306...97016
Метод
Create Campaign
Комиссия сети
0.0001
ETH
0,26 $
Скорость
Максимальная комиссия
0.0001 0,26 $
Одноразовый код
18
Данные
Функция
createCampaign
Param #1
Test
Param #2
10000...00000
Param #3
604800
Отмена
Подтвердить

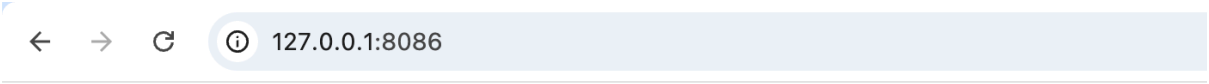

127.0.0.1:8086
Подтвердите действие на 127.0.0.1:8086
Campaign Created!
OK
Education Crowdfunding
Connect MetaMask
Address: 0x70997970C51812dc3A010C7d01b50e0d17dc79C8
ETH Balance: 9999.888245220074405551
EDU Token Balance: 11.0
Create Campaign
Test
1
Create
Donate
Campaign ID (e.g. 0)
ETH amount
Donate
Campaign List
Refresh List
MetaMask
Imported Account 2
0,00 $
+0,00 $ (+0,00 %) Обзор
Купить
Обмен...
Отправ...
Получи...
Say hello to Bitcoin
Trade, manage, and buy BTC directly on MetaMask
Токены
DeFi
NFT
Деятельность
Hardhat Local
Feb 8, 2026
Create Campaign
Подтверждено
-0 ETH
-0,00 $
Contribute
Подтверждено
-0.01 ETH
-20,96 $
Create Campaign
-0 ETH


127.0.0.1:8086
Education Crowdfunding DApp
Connect MetaMask
Address: 0x70997970C51812dc3A010C7d01b50e0d17dc79C8
ETH Balance: 9999.888245220074405551
EDU Token Balance: 11.0
Create Campaign
Test
1
Create
Donate
Campaign ID (e.g. 0)
ETH amount
Donate
Campaign List
Refresh List
MetaMask
Imported Account 2
0,00 $
+0,00 $ (+0,00 %) Обзор
Купить
Обмен...
Отправ...
Получи...
Say hello to Bitcoin
Trade, manage, and buy BTC directly on MetaMask
Токены
DeFi
NFT
Деятельность
Hardhat Local
Feb 8, 2026
Create Campaign
Подтверждено
-0 ETH
-0,00 $
Contribute
Подтверждено
-0.01 ETH
-20,96 $
Create Campaign
-0 ETH


MetaMask
Imported Account 2
Imported accounts
Запрос транзакции
Сеть
Hardhat Local
Запрос от
HTTP
127.0.0.1:8086
Взаимодействие с
0x0B306...97016
Метод
Contribute
Сумма
0.01 ETH
Комиссия сети
0.0001
ETH
0,12 $
Скорость
Максимальная комиссия
0.0001 0,12 $
Одноразовый код
19
Данные
Функция
contribute
Param #1
0
Отмена
Подтвердить
MetaMask
Imported Account 2
Imported accounts
0x0B306...97016
Метод
Contribute
Сумма
0.01 ETH
Комиссия сети
0.0001
ETH
0,12 $
Скорость
Максимальная комиссия
0.0001 0,12 $
Одноразовый код
19
Отмена
Подтвердить


127.0.0.1:8086
Подтвердите действие на 127.0.0.1:8086
Donation Successful!
OK
Education Crowdfunding
Connect MetaMask
ETH Balance: 9999.888245220074405551
EDU Token Balance: 11.0
Create Campaign
Test
1
Create
Donate
0
0,01
Donate
Campaign List
Refresh List
MetaMask
Imported Account 2
0,00 $
+0,00 $ (+0,00 %) Обзор
Купить
Обмен...
Отправ...
Получи...
Say hello to Bitcoin
Trade, manage, and buy BTC directly on MetaMask
Токены
DeFi
NFT
Деятельность
Hardhat Local
Feb 8, 2026
Contribute
Подтверждено
-0.01 ETH
-20,96 $
Create Campaign
Подтверждено
-0 ETH
-0,00 $
Contribute
-0.01 ETH


MetaMask
Imported Account 2
0,00 $
+0,00 $ (+0,00 %) Обзор
Купить
Обмен...
Отправ...
Получи...
Say hello to Bitcoin
Trade, manage, and buy BTC directly on MetaMask
Токены
DeFi
NFT
Деятельность
Hardhat Local
Feb 8, 2026
Contribute
Подтверждено
-0.01 ETH
-20,96 $
Create Campaign
Подтверждено
-0 ETH
-0,00 $



Education Crowdfunding DApp

Connect MetaMask

Address: 0x70997970C51812dc3A010C7d01b50e0d17dc79C8

ETH Balance: 9999.878063777825101951

EDU Token Balance: 12.0

Create Campaign

Test | 1 | Create

Donate

0 | 0,01 | Donate

Campaign List

Refresh List

No campaigns found.