TESTING WEB3 APPLICATIONS

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Soumaya Erradi

- Lead software developer @ Scaling parrots
- Frontend specialist
- Web3 enthusiast
- IT and electronics divulger

Testing

Testing

Frontend testing is crucial to ensure the quality and reliability of web applications.

e2e testing

Testing technique that verifies the FUNCTIONALITIES and PERFORMANCE of an entire software application by simulating real-world user scenarios and replicating live data.

cypress

Cypress is an open-source, end-to-end testing framework designed for frontend web development.

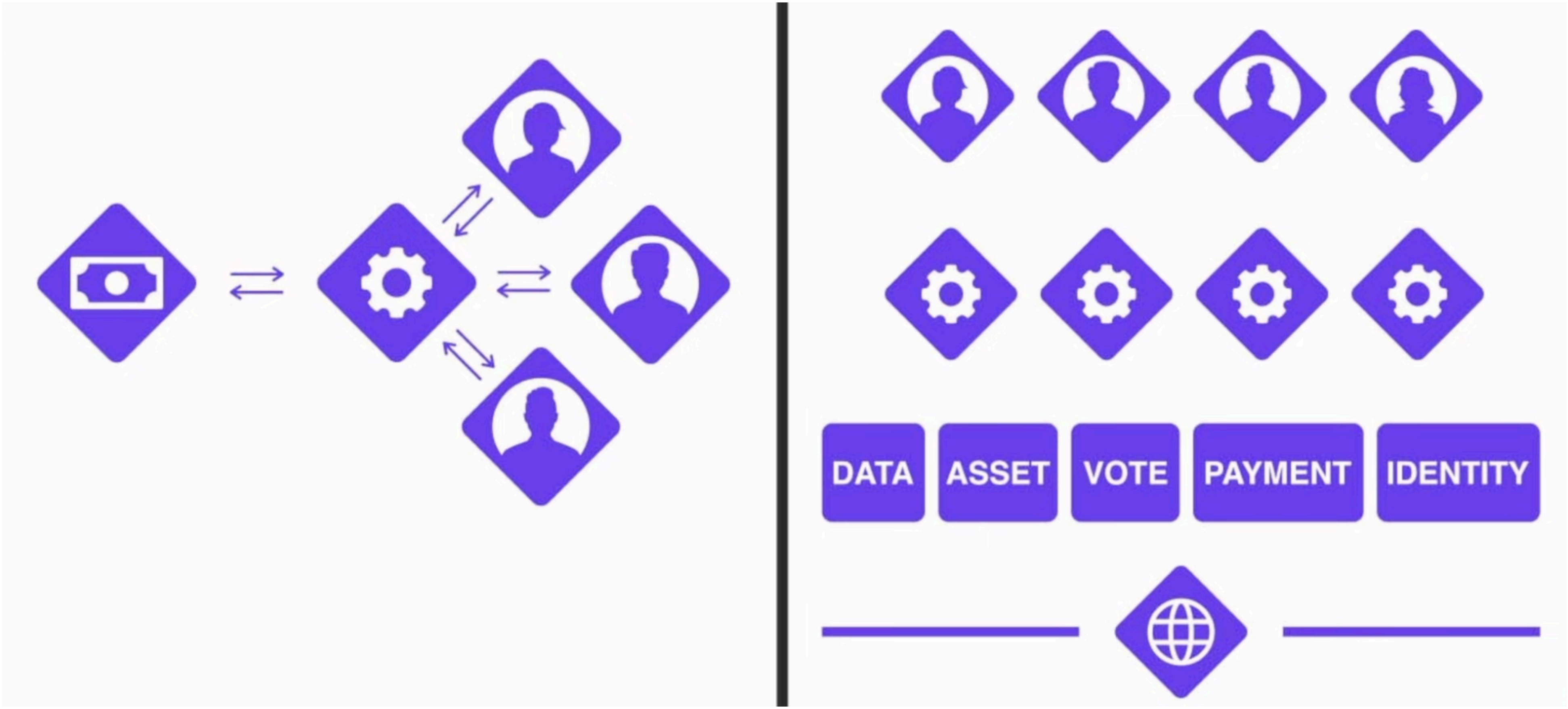
"Cypress' open-source app takes the pain out of front-end testing."

Cypress offers several key advantages for frontend testing:

- Real-Time Reloading
- Easy Setup
- Extensive Browser Support

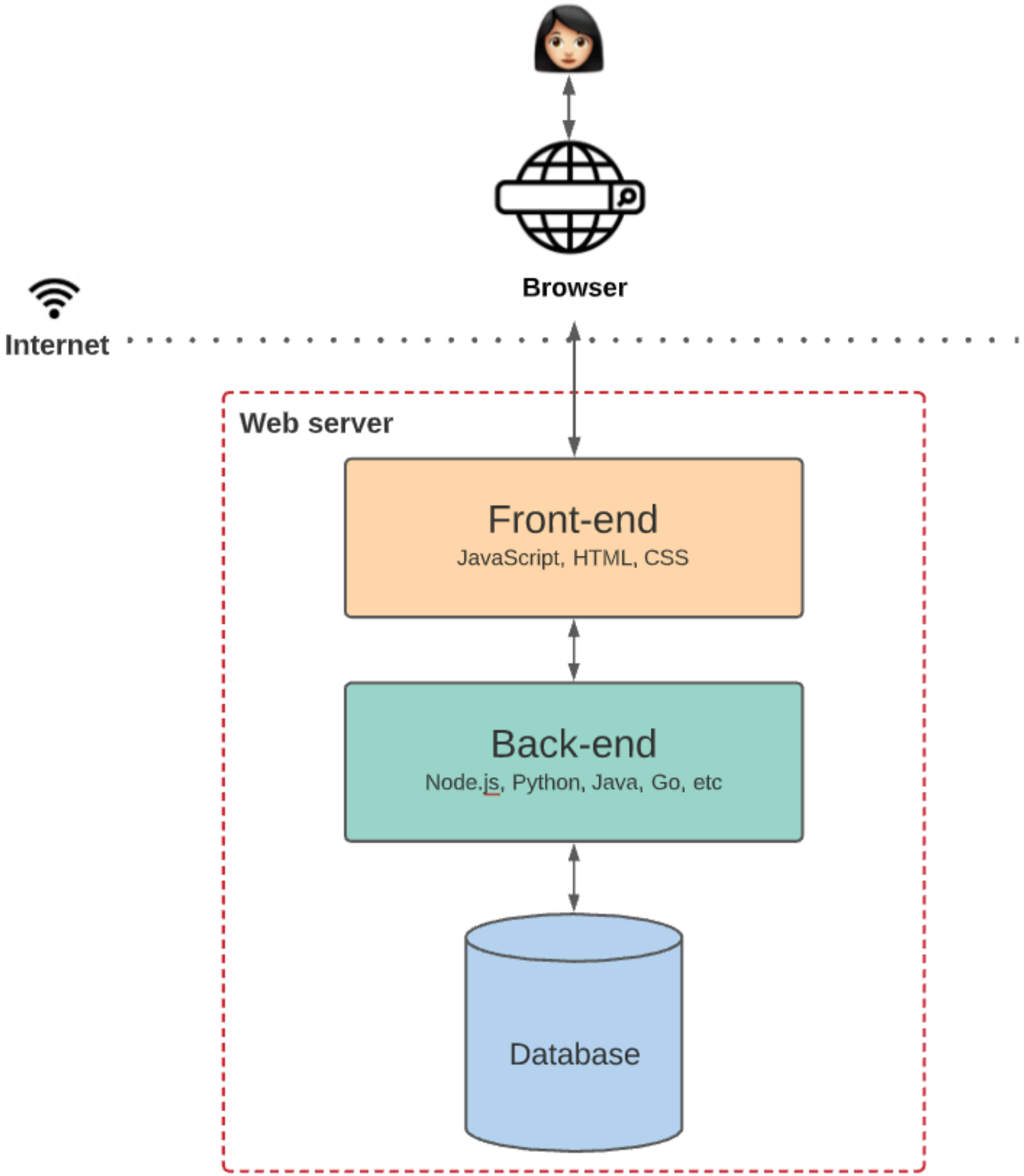
Web3

Web2 vs Web3

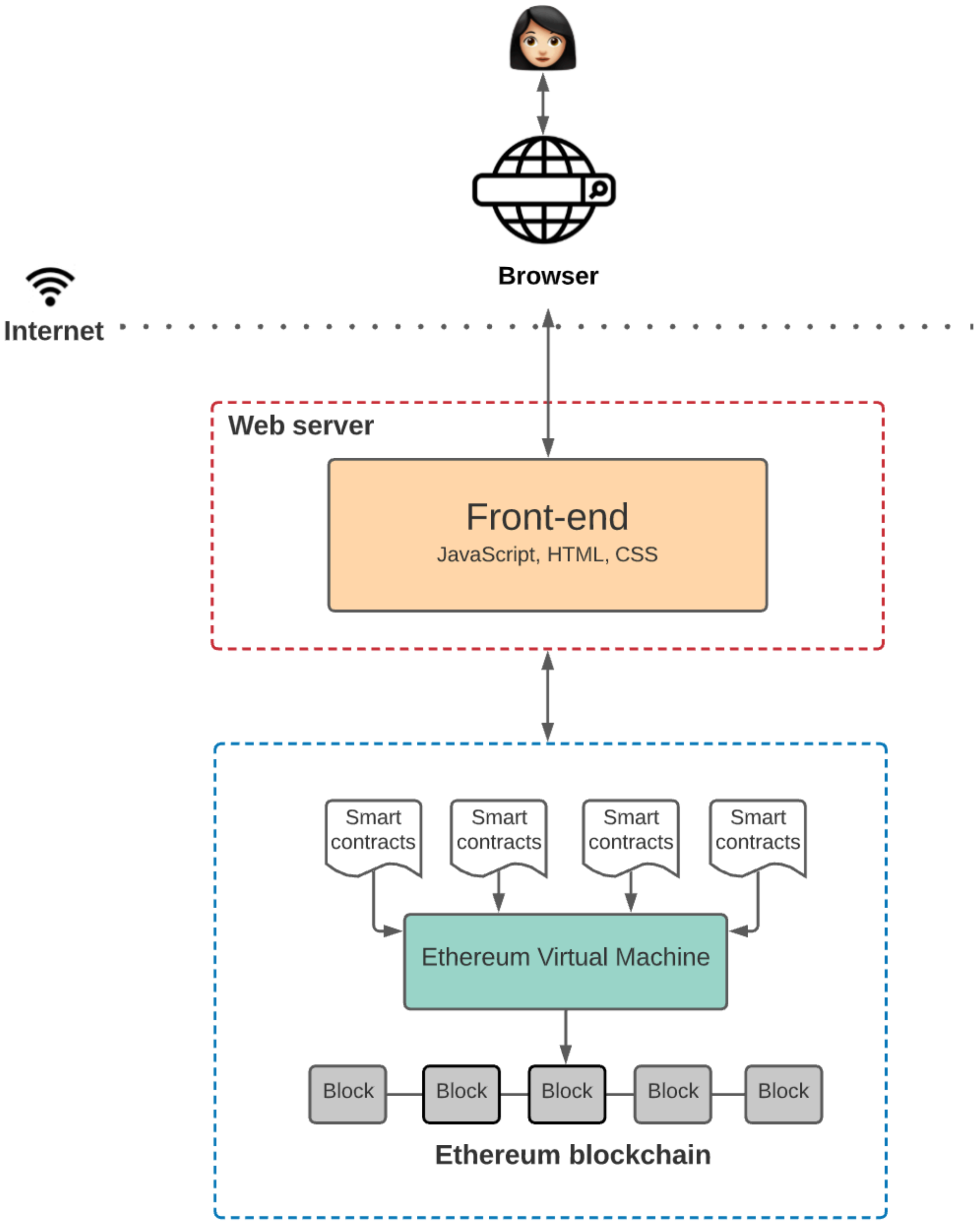


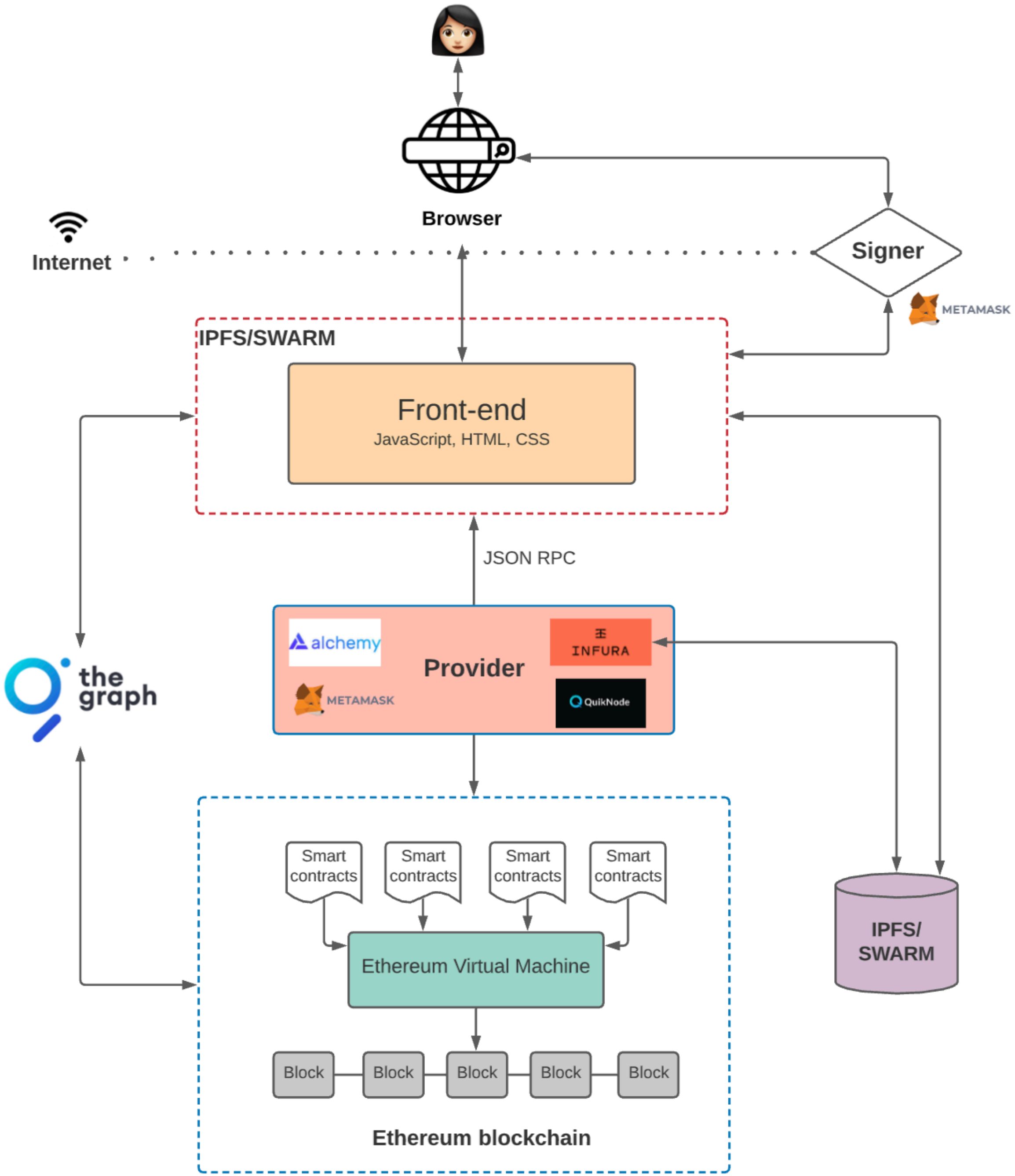
Web3 development

WEB2


Browser
Internet
Web server
Front-end
JavaScript, HTML, CSS
Back-end
Node.js, Python, Java, Go, etc
Database

WEB3


Browser
Internet
Web server
Front-end
JavaScript, HTML, CSS
Smart contracts
Smart contracts
Smart contracts
Smart contracts
Ethereum Virtual Machine
Block
Block
Block
Block
Block
Ethereum blockchain



Browser

Internet

Signer

METAMASK

IPFS/SWARM

Front-end

JavaScript, HTML, CSS

JSON RPC

Provider

alchemy

METAMASK

INFURA

QuikNode

the graph

Smart contracts

Smart contracts

Smart contracts

Smart contracts

Ethereum Virtual Machine

Block

Block

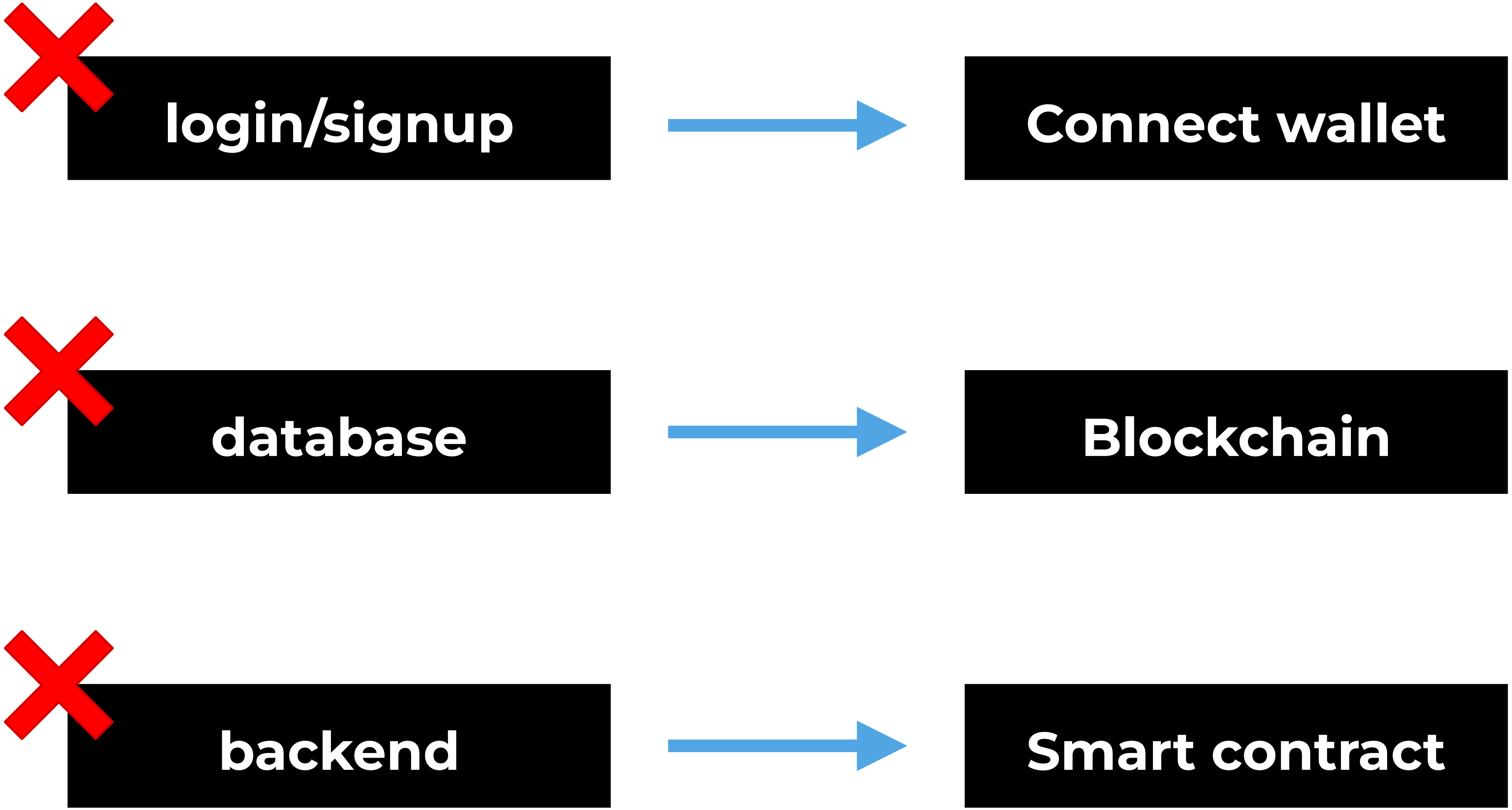
Block

Block

Block

Ethereum blockchain

IPFS/ SWARM



❌ login/signup → Connect wallet

❌ database → Blockchain

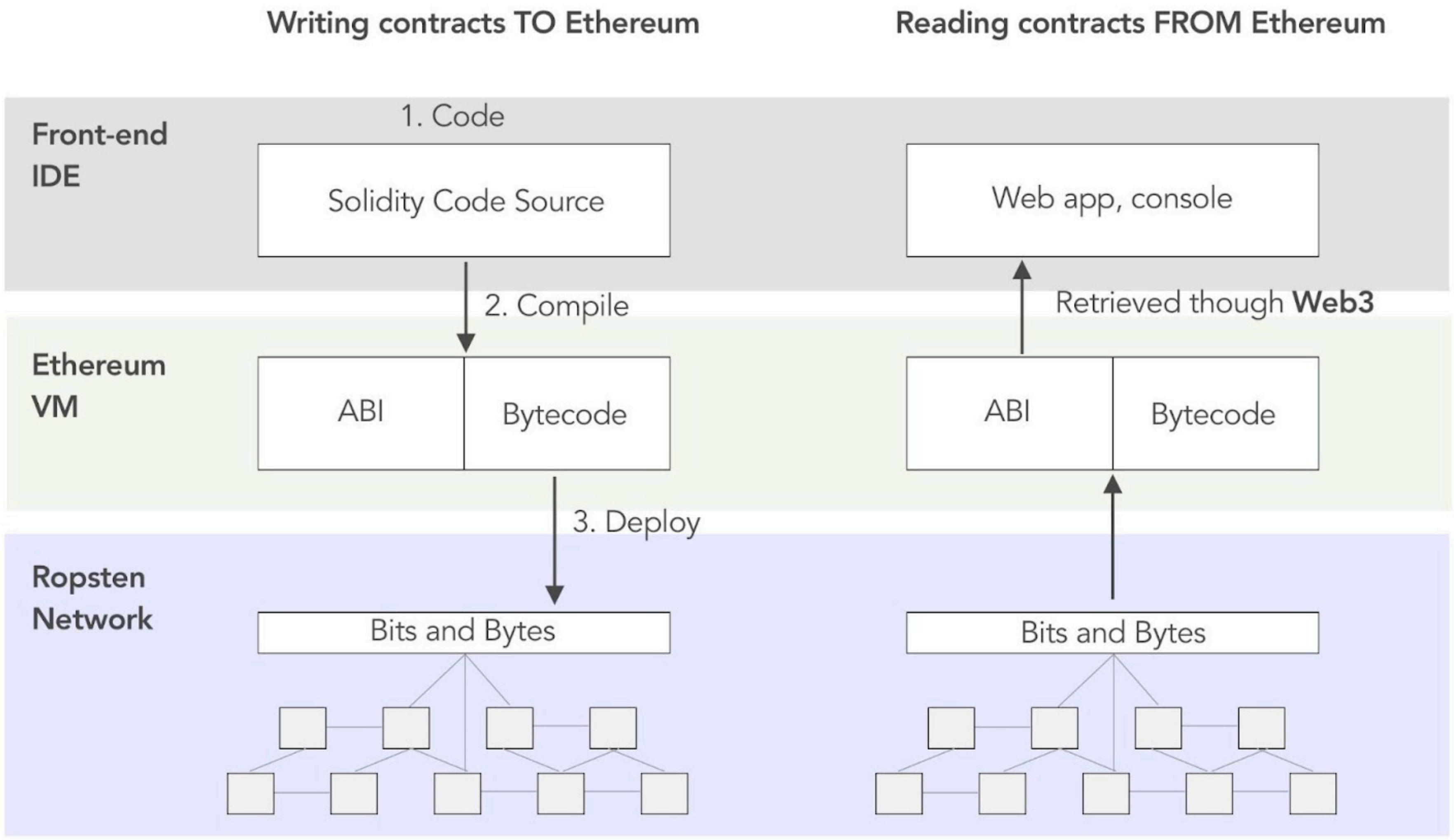
❌ backend → Smart contract

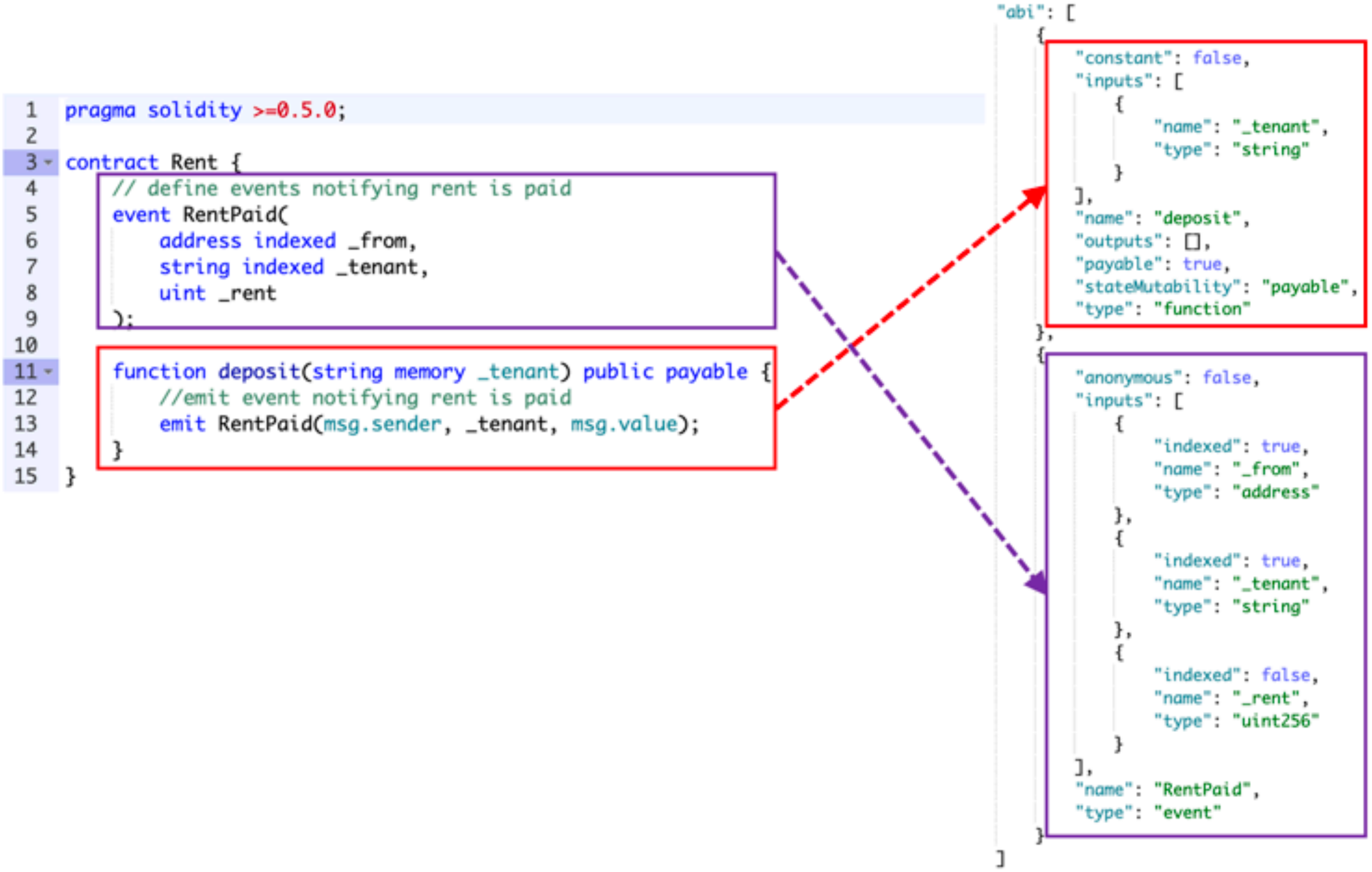
Web3 dev tools

Frontend framework/library

Wallet

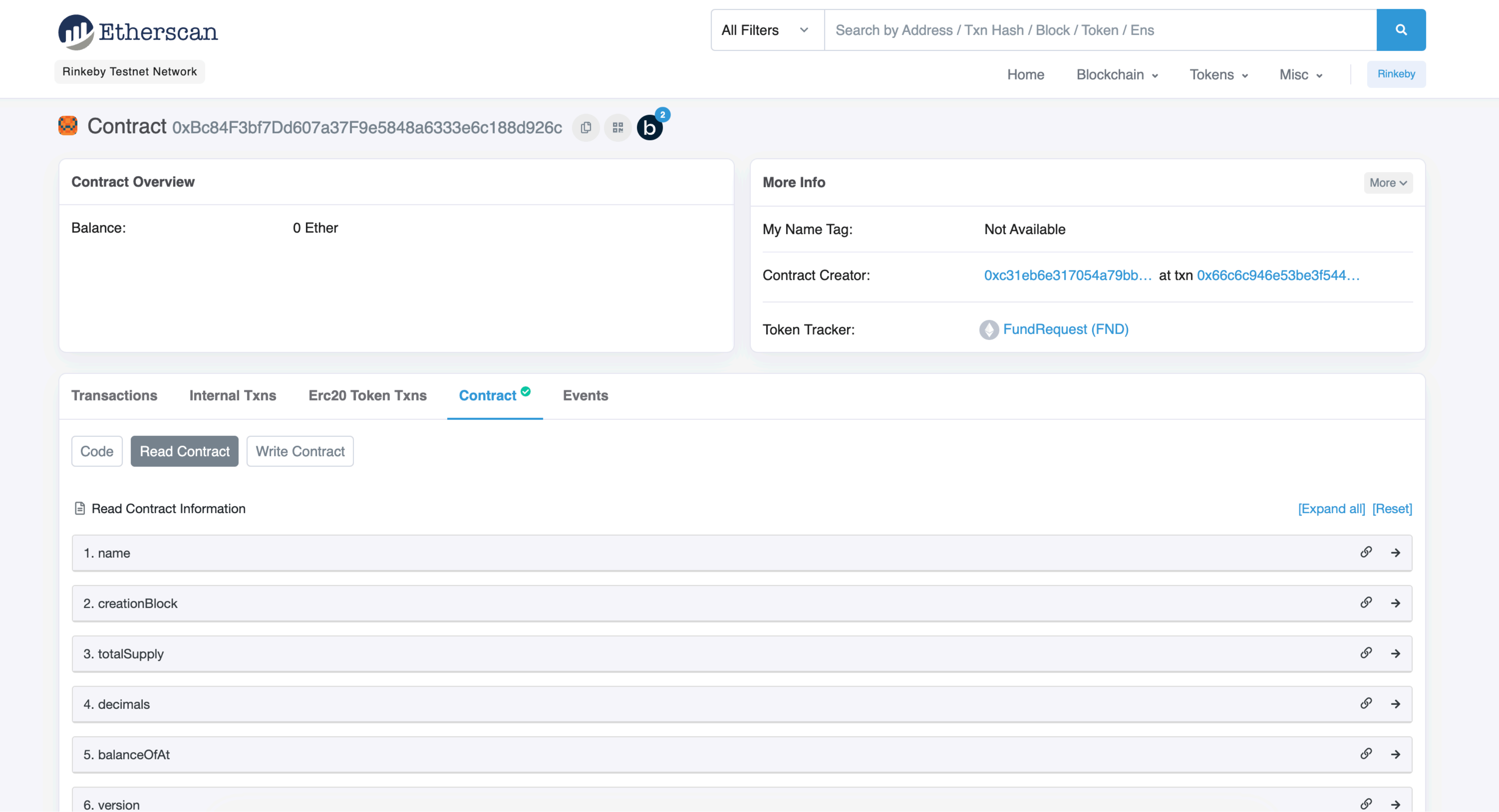
Smart contract





```solidity
pragma solidity >=0.5.0;

contract Rent {
    // define events notifying rent is paid
    event RentPaid(
        address indexed _from,
        string indexed _tenant,
        uint _rent
    );

    function deposit(string memory _tenant) public payable {
        //emit event notifying rent is paid
        emit RentPaid(msg.sender, _tenant, msg.value);
    }
}
```

```json
"abi": [
    {
        "constant": false,
        "inputs": [
            {
                "name": "_tenant",
                "type": "string"
            }
        ],
        "name": "deposit",
        "outputs": [],
        "payable": true,
        "stateMutability": "payable",
        "type": "function"
    },
    {
        "anonymous": false,
        "inputs": [
            {
                "indexed": true,
                "name": "_from",
                "type": "address"
            },
            {
                "indexed": true,
                "name": "_tenant",
                "type": "string"
            },
            {
                "indexed": false,
                "name": "_rent",
                "type": "uint256"
            }
        ],
        "name": "RentPaid",
        "type": "event"
    }
]
```



Contract 0xBc84F3bf7Dd607a37F9e5848a6333e6c188d926c

Contract Overview

Balance: 0 Ether

More Info

My Name Tag: Not Available

Contract Creator: 0xc31eb6e317054a79bb… at txn 0x66c6c946e53be3f544…

Token Tracker: FundRequest (FND)

Read Contract Information

1. name

2. creationBlock

3. totalSupply

4. decimals

5. balanceOfAt

6. version

Operations in Web3

- Read from smart contract
- Write in smart contract
- Wallet interaction

Wallet

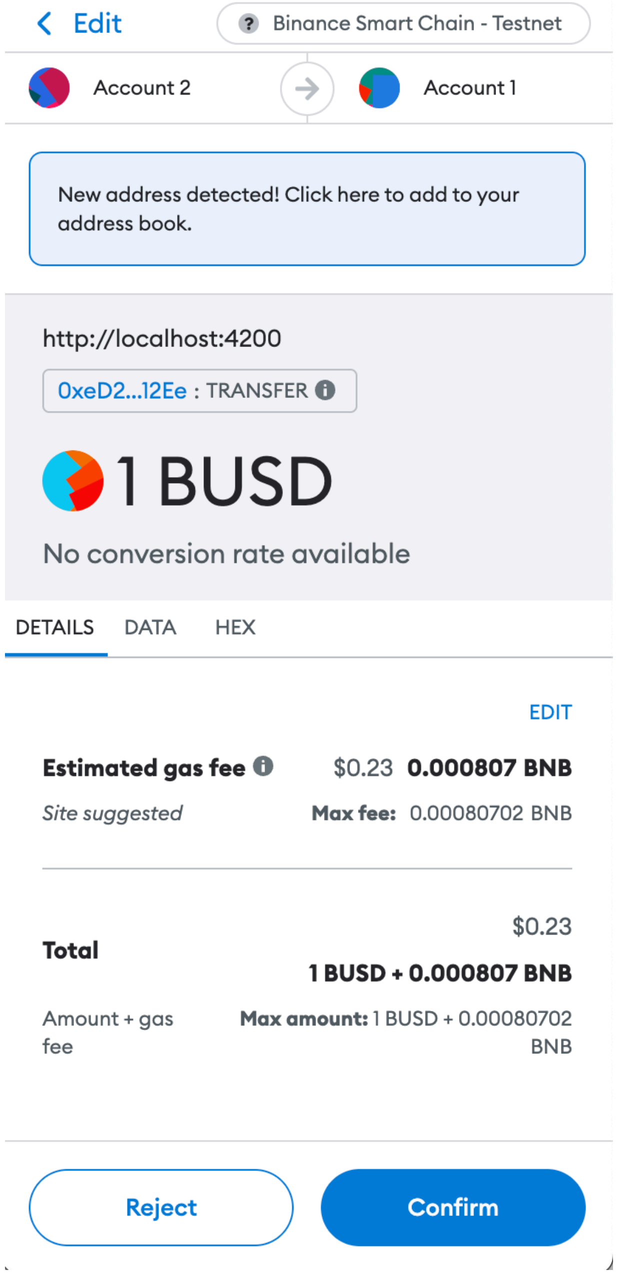
- Provider
- Wallet address
- Network

</> example

DApp x Defi that displays our current BUSD balance and allow us to transfer BUSD to other wallets

```
const provider = new ethers.providers.Web3Provider(window.ethereum);
const signer = provider.getSigner();
const userAddress = await signer.getAddress();



const busd = {
  address: "0x68ec573C119826db2eaEA1Efbfc2970cDaC869c4",
  abi: [
    "function balanceOf(address _owner) public view returns (uint256 balance)",
    "function transfer(address _to, uint256 _value) public returns (bool success)",
  ],
};

const busdContract = new ethers.Contract(busd.address, busd.abi, signer);

let busdBalance = await busdContract.balanceOf(userAddress);

console.log(busdBalance); // BigNumber {_hex: '0x7ce66c50e2840000', _isBigNumber: true}
console.log(ethers.utils.formatUnits(busdBalance, 18)); // 9.0
```

```
const busdContract = new ethers.Contract(busd.address, busd.abi, signer);

const tx = await busdContract.transfer(receiver, amount);

const receipt = await tx.wait();
```



New address detected! Click here to add to your address book.

http://localhost:4200

0xeD2...12Ee : TRANSFER

1 BUSD

No conversion rate available

Estimated gas fee	$0.23 **0.000807 BNB**
Site suggested	**Max fee:** 0.00080702 BNB
Total	$0.23 **1 BUSD + 0.000807 BNB**
Amount + gas fee	**Max amount:** 1 BUSD + 0.00080702 BNB

```
const tx = await busdContract.transfer(receiver, amount);
console.log (`Transaction hash: ${tx.hash}`);


const receipt = await tx.wait();
console.log (`Transaction confirmed in block ${receipt.blockNumber}`);
```

Testing Web3 applications

Wallet

Smart contract

E2E testing of wallet connection and interaction is critical to providing a seamless and secure experience for users of web3 applications.

It ensures that users can confidently manage their blockchain assets and interact with decentralized applications (dApps) while safeguarding their security and privacy.

Wallet connection and the transactions in Web3 are signed by a private scheme, making it difficult for UI frameworks to handle.

Options

1. Any end-to-end testing tool and mock the Web3 interactions

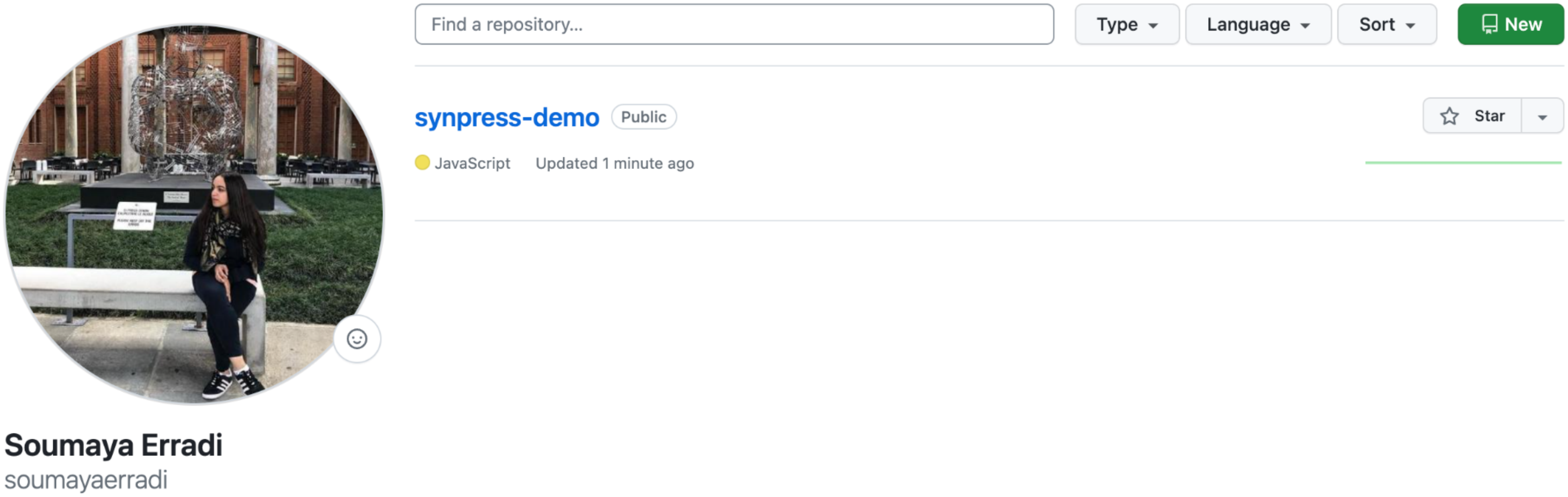
2. A Cypress wrapper with Metamask support.

Synpress helps you write e2e tests for Dapps.
It is a complete e2e testing framework built on top of
Cypress and playwright with support for metamask.

https://github.com/Synthetixio/synpress

https://github.com/Synthetixio/synpress/blob/dev/docs/synpress-commands.md

Demo



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synpress-demo Public

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Thank you!

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