



**Building trust
one block at the time**



Think & Dev
Blockchain Development Services
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Voting Dapp with Soul Bound Token



M E T I S

¿Quiénes somos?

Software factory basada en Delaware, USA, especializada
100% en proyectos **Blockchain de alta complejidad**

¿Quiénes somos?

Alejo Lovallo:

- Sr Blockchain Developer.
- ETH Latam Buenos Aires 2022 Speaker.
- Almost Software Engineer.
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Objetivo

Smart Contracts

- Setup proyecto Hardhat con Metis Testnet
- Desarrollo de un Soul Bound Token (SBT)
- Desarrollo de un contrato de votación

FrontEnd

- Setup proyecto con Next js
- Setup Wagmi
- Setup interacción con contratos

Why Metis?

- Metis es una blockchain de Capa o Layer 2.
- Escalabilidad y performance.
- Facilidad de uso.
- **Tiempo de adaptación siendo blockchain dev en Layer 1 es cero.**
- **Documentación.**
- Comunidad y ecosistema.



M E T I S

Setup proyecto Metis Testnet

hardhat.networks.ts:

- Chain ID: 599
- URL: <https://goerli.gateway.metisdevops.link>
- Accounts



```
1  const networks: any = {
2    localhost: {
3      chainId: 31337,
4      url: 'http://127.0.0.1:8545',
5      allowUnlimitedContractSize: true,
6      timeout: 1000 * 60
7    },
8    hardhat: {
9      live: false,
10     allowUnlimitedContractSize: true,
11     tags: ['test', 'local']
12   },
13   metis: {
14     live: true,
15     chainId: 599,
16     url: 'https://goerli.gateway.metisdevops.link',
17     accounts: {
18       mnemonic: process.env.MNEMONIC ? process.env.MNEMONIC : ''
19     },
20     allowUnlimitedContractSize: false,
21     timeout: 1000 * 60,
22     tags: ['metis', 'testnet']
23   }
24 }
```

Setup proyecto Metis Testnet

- **Añadir Metis Testnet a Metamask**

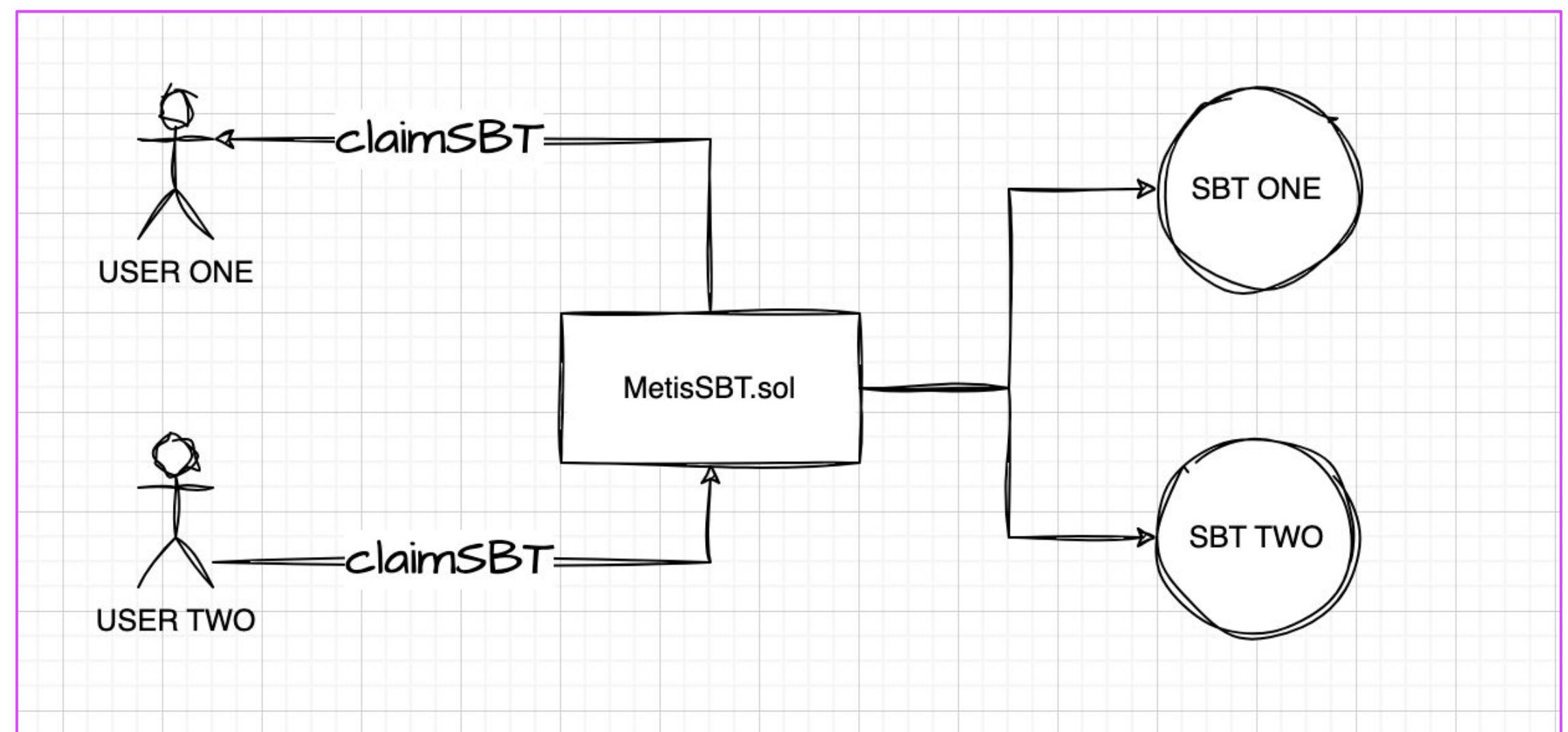
- Network name: Metis Goerli Testnet
- Chain ID: 599
- RPC URL:
`https://metis-goerli-testnet.rpc.thirdweb.com/<tokenId>`
- Currency Symbol: METIS
- Block explorer url: <https://goerli.explorermetisdevops.link>

- **Obtener Metis Testnet Tokens:**

<https://goerli.faucet.metisdevops.link/>



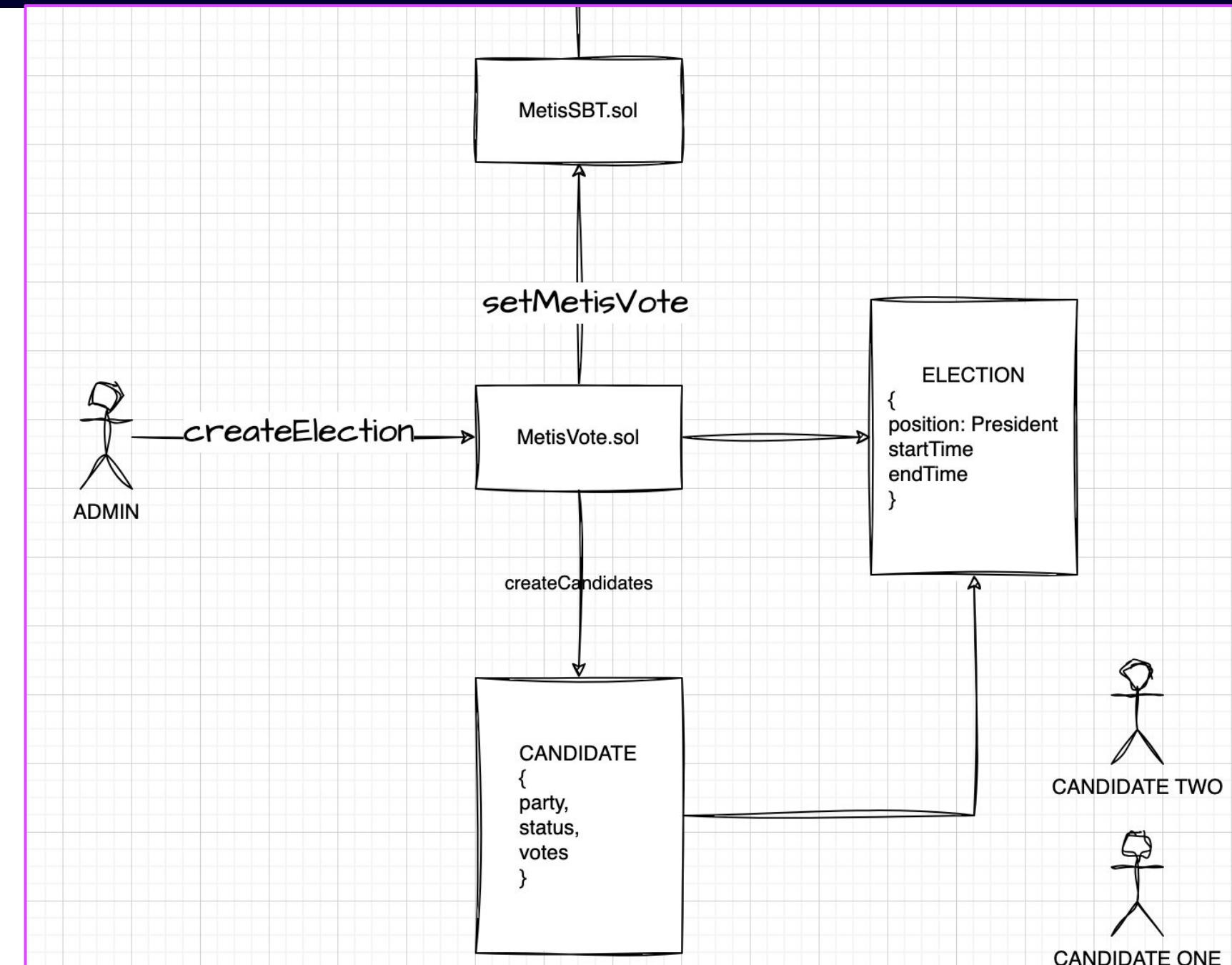
Voting Dapp: Metis SBT



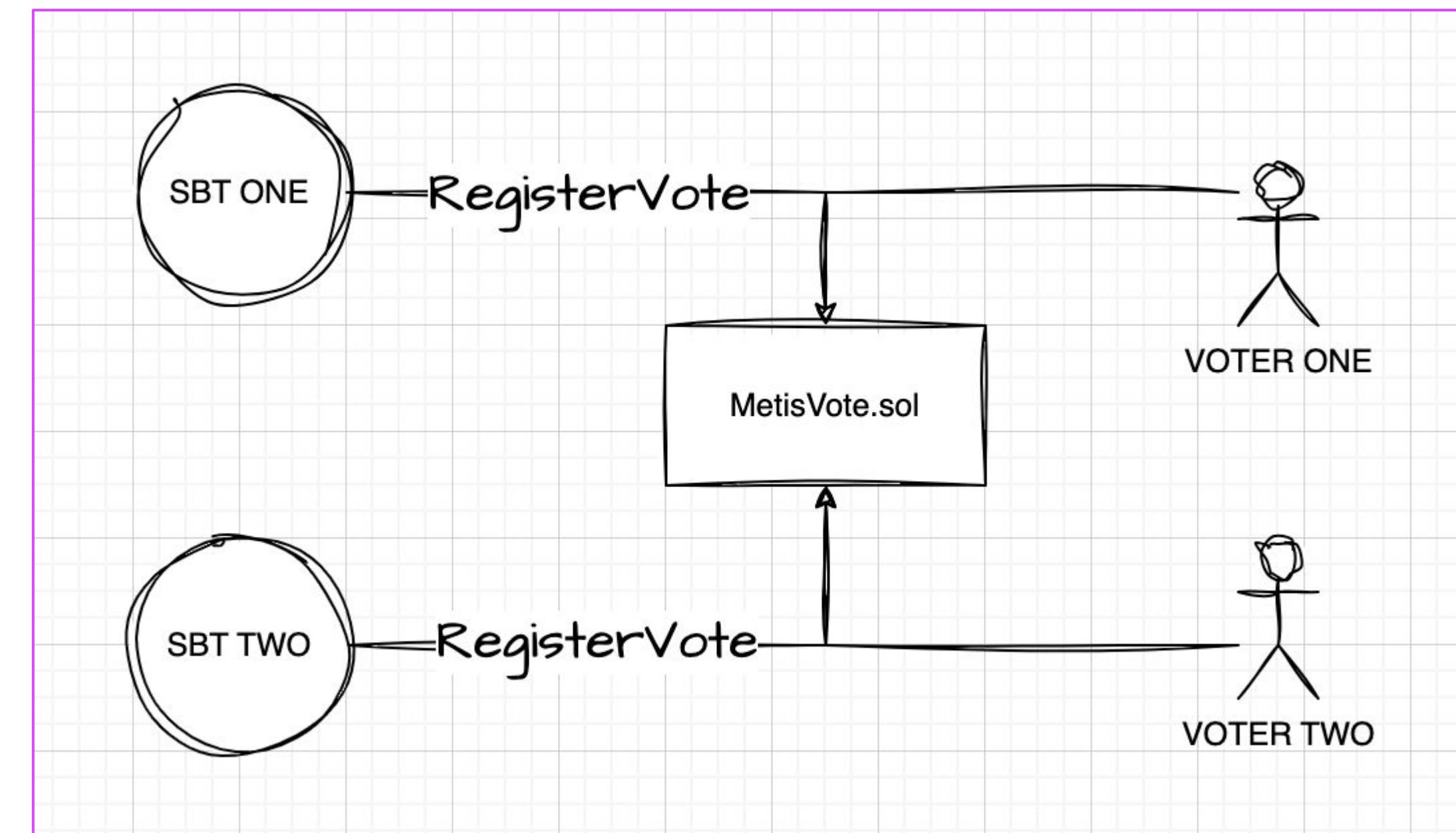
Voting Dapp: Metis Vote

Interacciones y relaciones

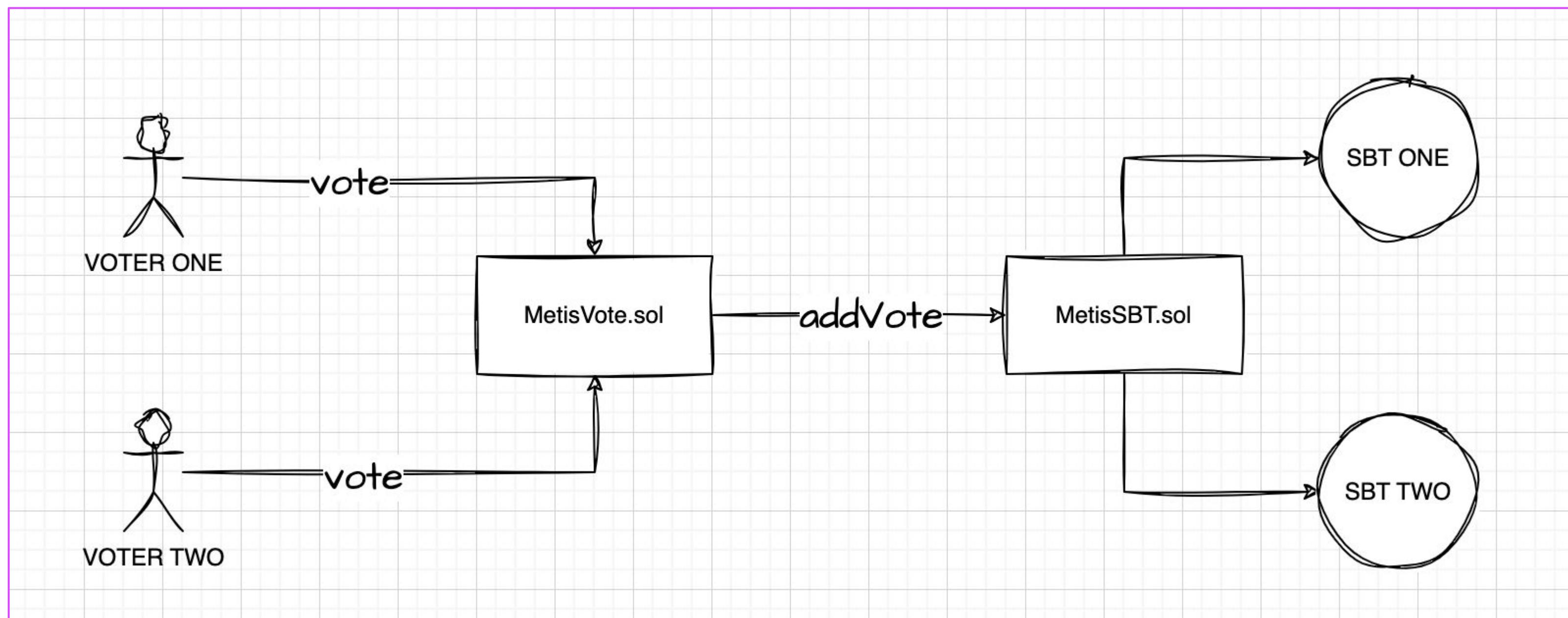
- Para votar debe existir una elección y candidatos
- Para votar se debe registrar como votante
- Para poder ser registrado como votante se debe poseer un metisSBT



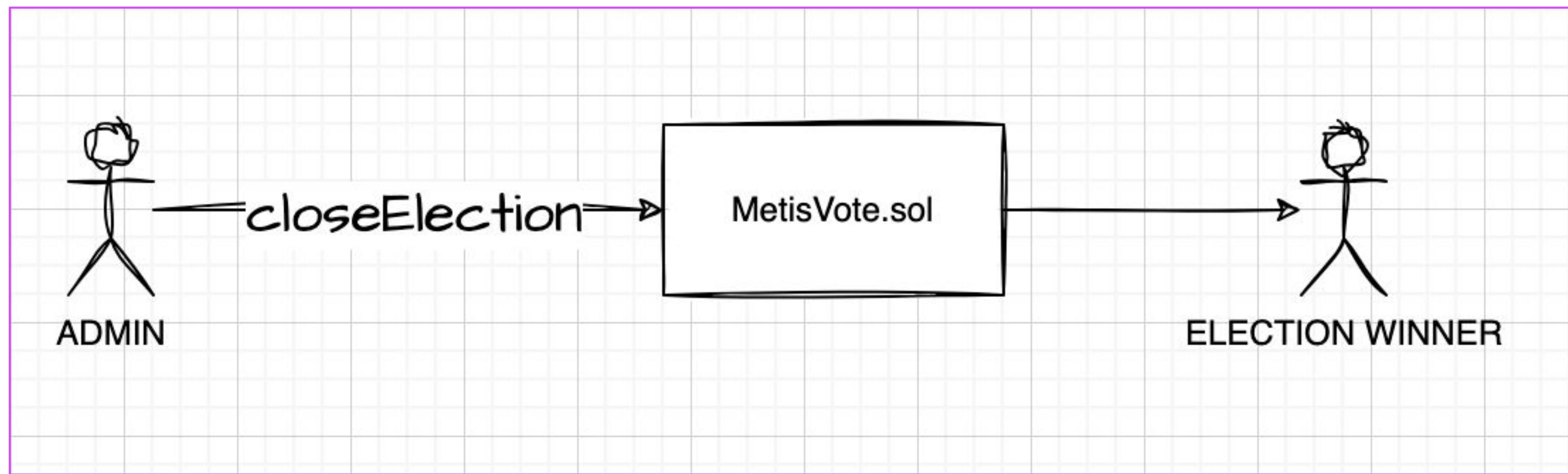
Voting Dapp



Voting Dapp



Voting Dapp



Stack y recursos

Smart Contracts

- Solidity >= v0.8x
 - Hardhat
 - Typescript
-

Front End

- Next js
 - Typescript
 - Tailwind
 - Wagmi
-

SoulBound Tokens

- ¿Qué son?
- ¿Por qué?
- ¿Para qué?
- ¿Cómo?



SBTs: NFTs Intransferibles

Soul bound tokens se definen como NFTs intrasferibles, asociados al **alma** de quién los posee.

- ID
- Licencias
- Registros
- Diplomas



SBTs: ERC & Interface

ERCx

State

- ERC4671: Non-Tradable Tokens Standard

Stagnant



- ERC1238

Withdrawn



- IERC5192

ERC



SBTs: Implementación

```
// SPDX-License-Identifier: CC0-1.0
pragma solidity ^0.8.0;

interface IERC5192 {
    /// @notice Emitted when the locking status is changed to locked.
    /// @dev If a token is minted and the status is locked, this event should be emitted.
    /// @param tokenId The identifier for a token.
    event Locked(uint256 tokenId);

    /// @notice Emitted when the locking status is changed to unlocked.
    /// @dev If a token is minted and the status is unlocked, this event should be emitted.
    /// @param tokenId The identifier for a token.
    event Unlocked(uint256 tokenId);

    /// @notice Returns the locking status of an Soulbound Token
    /// @dev SBTs assigned to zero address are considered invalid, and queries
    /// about them do throw.
    /// @param tokenId The identifier for an SBT.
    function locked(uint256 tokenId) external view returns (bool);
}
```

Voting contract

¿Qué queremos lograr?

1. ¿Cómo interactuamos con nuestro SBT?
2. Creación de elecciones y candidatos
3. Votar
4. Finalizar elección

Compile



- **yarn compile**

```
alejo@Admins-MacBook-Pro contracts % yarn compile
yarn run v1.22.19
$ npx hardhat compile
Generating typings for: 18 artifacts in dir: typechain-types for target: ethers-v5
Successfully generated 50 typings!
Compiled 18 Solidity files successfully
✨ Done in 5.05s.
```

Deploy



- **yarn deploy**

```
alejo@Admins-MacBook-Pro contracts % yarn deploy
yarn run v1.22.19
$ npx hardhat deploy
Nothing to compile
No need to generate any newer typings.

Deploying MetisSBT contract on hardhat...
Contract Deployment Complete!
  ContractName MetisSBT
  ContractAddress - 0x5FbDB2315678afecb367f032d93F642f64180aa3

Deploying MetisVote contract on hardhat...
Contract Deployment Complete!
  ContractName MetisVote
  ContractAddress - 0xe7f1725E7734CE288F8367e1Bb143E90bb3F0512
✨ Done in 3.78s.
```

Tests



- yarn tests

Solc version: 0.8.18	Optimizer enabled: false	Runs: 200	Block limit: 30000000 gas
Methods			
Contract Method			
MetisSBT . claimSBT	148531	165631	152806
MetisSBT . mint	143838	178038	155238
MetisSBT . safeLazyMint	-	-	51251
MetisSBT . safeLazyMintBatch	97671	143363	120517
MetisSBT . setContractURI	-	-	49711
MetisSBT . setDefaultTokenURI	-	-	49820
MetisSBT . setMetisVote	-	-	47560
MetisVote . addCandidate	103806	120906	109506
MetisVote . changeEndTimeElection	-	-	34046
MetisVote . closeElection	-	-	36175
MetisVote . createElection	99030	99042	99034
MetisVote . registerVoter	-	-	51706
MetisVote . vote	78932	96032	87482
Deployments			
MetisSBT	-	-	3627608
MetisVote	-	-	2510493
			% of limit
			12.1 %
			8.4 %
44 passing (3s)			
★ Done in 6.84s.			

Coverage



- yarn coverage

44 passing (2s)

File	% Stmt	% Branch	% Funcs	% Lines	Uncovered Lines
contracts/	89.58	63.64	89.47	90.55	
MetisSBT.sol	95.45	73.81	90	96.88	48,157
MetisVote.sol	84.62	57.35	88.89	84.13	... 112,113,130
contracts/interfaces/	100	100	100	100	
IERC5192.sol	100	100	100	100	
IMetisSBT.sol	100	100	100	100	
IMetisVote.sol	100	100	100	100	
All files	89.58	63.64	89.47	90.55	

Size



- yarn size

```
alejo@Admins-MacBook-Pro contracts % yarn size
yarn run v1.22.19
$ npx hardhat size-contracts
Nothing to compile
No need to generate any newer typings.
```

Solc version: 0.8.18	Optimizer enabled: false	Runs: 200
Contract Name	Size (KiB)	Change (KiB)
Address	0.084	-
Counters	0.084	-
ERC721	8.281	-
Math	0.084	-
MetisSBT	15.730	-
MetisVote	10.895	-
Strings	0.084	-

Done in 1.68s.

Deploy Metis Testnet



- `yarn deploy --network metis`

```
alejo@Admins-MacBook-Pro contracts % yarn deploy --network metis
yarn run v1.22.19
$ npx hardhat deploy --network metis --reset
Nothing to compile
No need to generate any newer typings.
```

```
Deploying MetisSBT contract on metis...
Contract Deployment Complete!
```

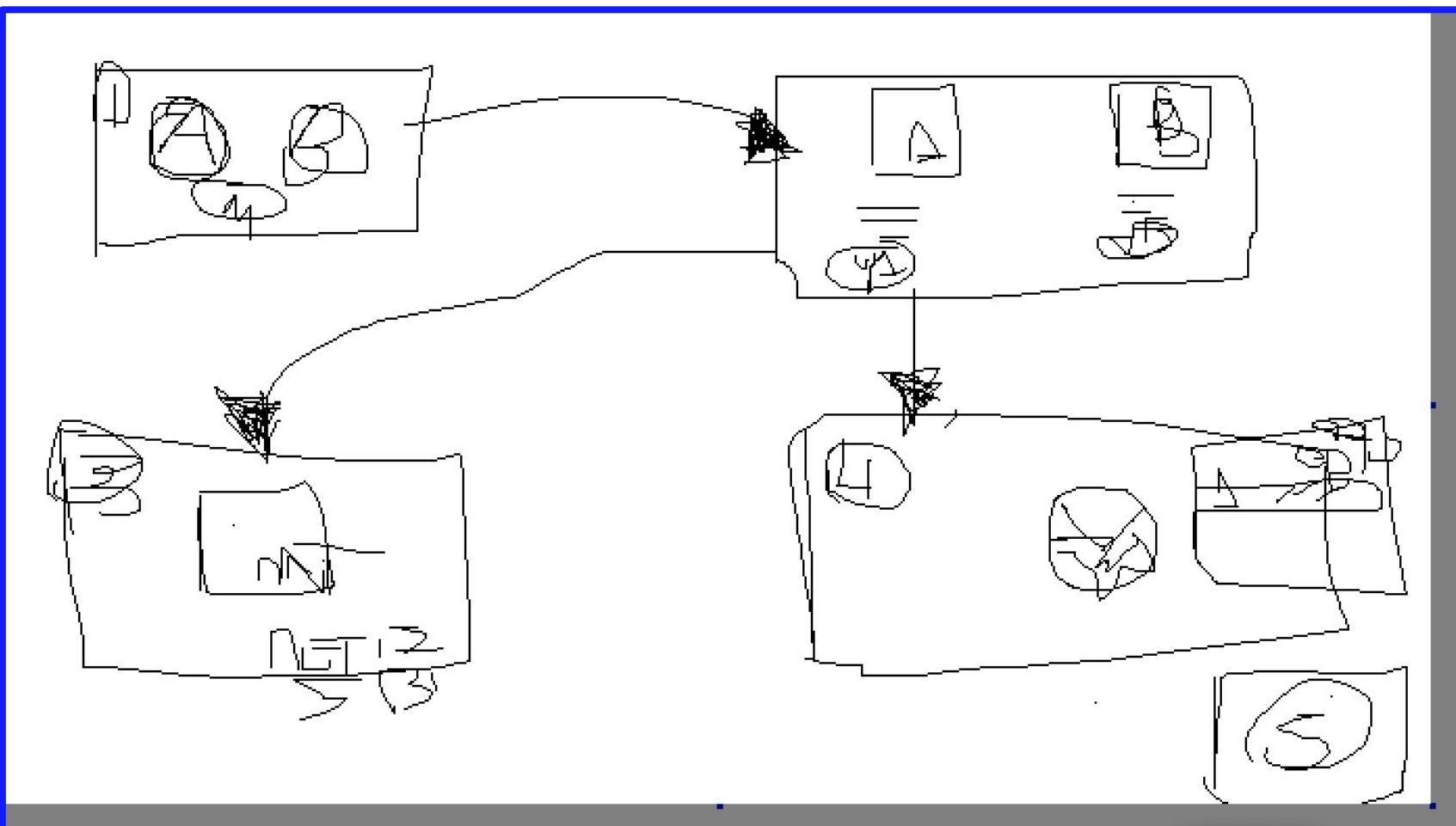
```
ContractName MetisSBT
ContractAddress - 0xE30CE4d3f116C236913cd0188227f55D85fcab41
```

```
Deploying MetisVote contract on metis...
Contract Deployment Complete!
```

```
ContractName MetisVote
ContractAddress - 0x8626e41eb1B08633e0981AC2Bb608e08AD85a169
```

Dapp

- ¿Qué queremos lograr?
- ¿Cómo interactuamos con nuestro SBT?
- Mintear SBTs, Votar, Visualización de votaciones, etc.



Wagmi

- Es una colección de React Hooks
- Conexión con diferentes wallets
- Administración de contratos
- ENS



Wagmi setup

1. Importamos

```
import { WagmiConfig, createConfig } from 'wagmi'
```

2. Configuramos el cliente

```
const config = createConfig({  
  autoConnect: true,  
  publicClient: createPublicClient({  
    chain: metisGoerli,  
    transport: http()  
  }),  
})
```

Wagmi setup

3. Colocamos el Wrapper en el entrypoint de nuestra aplicación

```
export default function App({ Component, pageProps }: AppProps) {
  return <ClientRehydration>
    <WagmiConfig config={config}>
      <Toaster position="top-right" richColors />
      <Image src={'/bg.png'} alt="background" fill />
      <div style={{ position: 'absolute', top: 0, left: 0, width: '100%', height: '100%' }}>
        <Layout>
          <Component {...pageProps} />
        </Layout>
      </div>
    </WagmiConfig>
  </ClientRehydration>
}
```

Dapp & Contratos

Wagmi nos provee de dos **hooks**

- ***UseContractRead***

- ***UseContractWrite***

Dapp & Contratos

- **UseContractRead:** Para realizar operaciones de lectura

```
const { data: isAddressContractOwner, refetch: refetchisAddressContractOwner } = useContractRead({  
    address: `0x${METIS_VOTE_ADDRESS}`,  
    abi: metisVoteContract.abi,  
    functionName: "owner"  
})
```



Dapp & Contratos

- **UseContractWrite:** Para realizar operaciones de escritura

```
const registerVoter = useContractWrite({
  address: `0x${METIS_VOTE_ADDRESS}`,
  abi: metisVoteContract.abi,
  functionName: "registerVoter",
  onError: (error) => {
    const moreThan80Chars = error.message.length > 80;
    toast.error(`${error.message.slice(0, 80)}${(moreThan80Chars ? '...' : '')}`);
  },
  onSuccess: () => {
    toast.success("Voter Registered!");
  }
})
```

```
registerVoter.write({
  args: [userSbtTokenId]
})
```

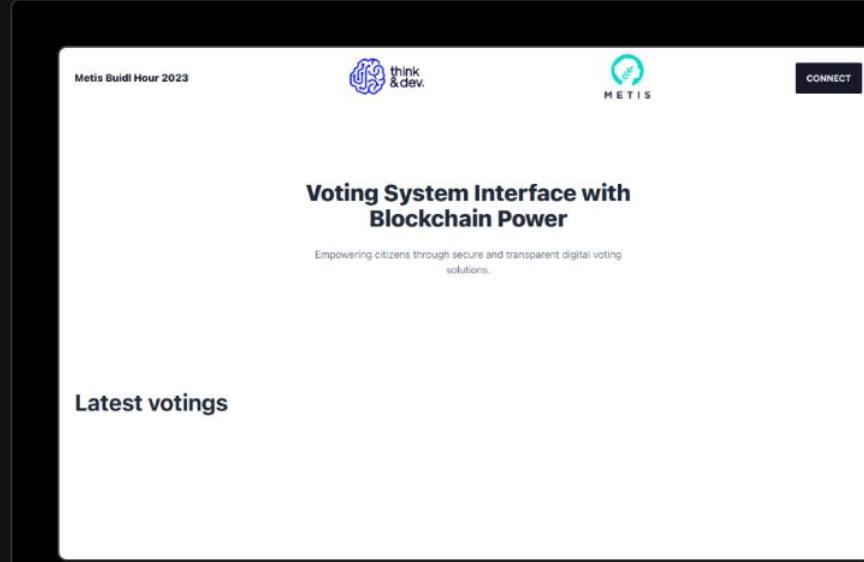
Deploy a Vercel

metis-workshop

[View Git Repository](#) [Visit](#)

Production Deployment

The deployment that is available to your visitors.



DEPLOYMENT
metis-workshop-50b1jrf5s-metisworkshop.vercel.app

DOMAINS
metis-workshop.vercel.app [+2](#)

STATUS CREATED [i](#)
● Ready 8h ago by MrRaccxxn 

SOURCE
↳ main
-o 91e4436 Stats and redirect after vote

Upcoming ● Building · feat(doc): add front doc 1m ago by  AlejoLovallo [Cancel](#)

Posibles mejoras

- Incrementar el test coverage
- Implementar diferentes tipos de votaciones
- Implementar sistema de ballotage
- Creación de subgrafos para reducir el tamaño de los contratos y obtención de datos

Let's build together Let's talk!



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