Design and Analysis of Tokenomics Processes

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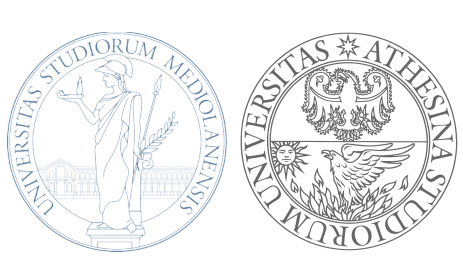


TOKENOMICS

Tokenomics refers to the economic analysis of cryptographic tokens, encompassing supply management (emission and burning mechanisms), distribution strategies, value determination, and functional utility within blockchain-based systems [1]

[1] Young Sook Kim, Seng-Phil Hong, and Marko Majer. Validation of value-driven token economy: focus on blockchain content platform. Future In- ternet, 16(5):178, 2024.

RELATED WORK

Alredy existing aproaches allow to model and analyze an economy textual languages. CadCAD [1], CasCAD2 [2], Tokenomics-Simulator [3] and Machinations [4]

- Require **technical** expertise
- Not specific for tokenomics
- No automatic **translation**

[1] https://cadcad.org/

[2] X. Liang et al., "From cadCAD to casCAD2: A Mechanism Validation and Verification System for Decentralized Autonomous Organizations Based on Parallel Intelligence," in IEEE Transactions on Computational Social Systems, vol. 11, no. 2, pp. 2853-2862, April 2024.

[3] https://crates.io/crates/tokenomics-simulator/0.1.1

[4] https://machinations.io/

TATAMI

TATAMI is a platform-independent workflow-based visual modeling language specifically tailored for tokenomics

Canvas

- **Interactive workspace** for arranging blocks
- Blocks interconnected in **token flows**

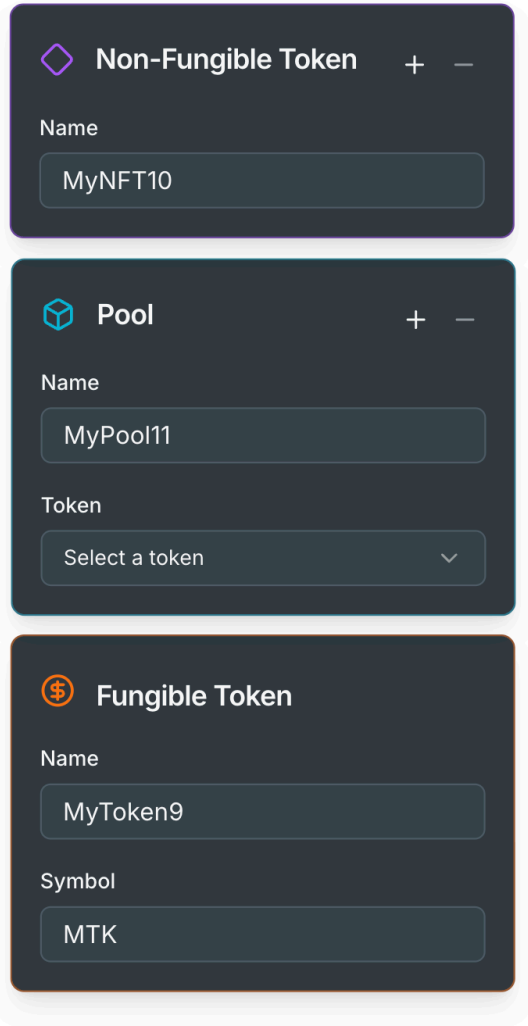
Model State

- Aggregates **inputs, variables, mappings, and constants**
- **Dynamically** read and modified by flow blocks

Independent Elements

Elements that need to be managed throught token flows.

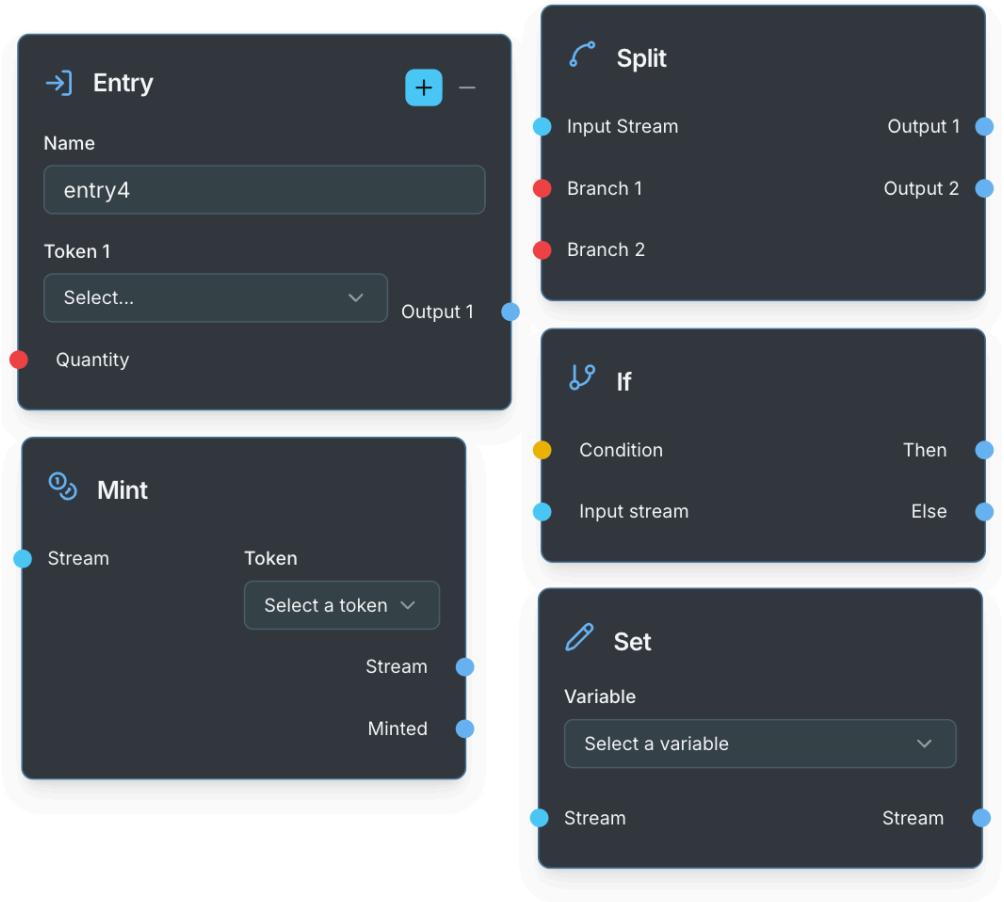
- **Fungible Tokens**: Identical tokens
- **NFTs**: Unique assets with distinct identity and custom metadata
- **Pool**: Key-based containers for accumulating tokens



Flow Blocks

Blocks interconnected through token streams.

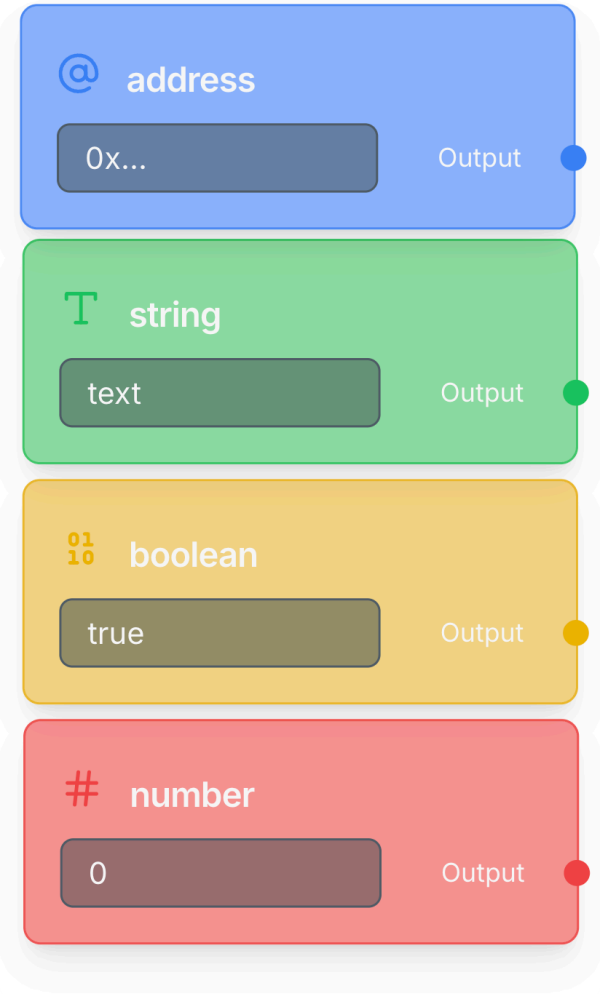
- **Entry**: Mandatory starting point for every workflow
- **Withdraw / Deposit**: Interaction with Pools
- **Mint / Burn / Transfer**: Token lifecycle management
- **If / Split / Join / Set**: Token streams and model state manipulation



Type Blocks

Blocks to cast some text or reference to the model state to a specific type.

- **Numeric**: Math expressions
- **Boolean**: Boolean expressions for conditional blocks
- **String**: Value for names, or descriptive attributes
- **Address**: Identifiers for accounts interacting with the tokenflow



Model State Component

The Model State manages the data layer of the system, including both generated and custom elements.

Auto-generated

Elements created by the system:

- **Sender** and **BlockNumber**
- **FT/NFT** attributes
- **Pool** balances

Custom Elements

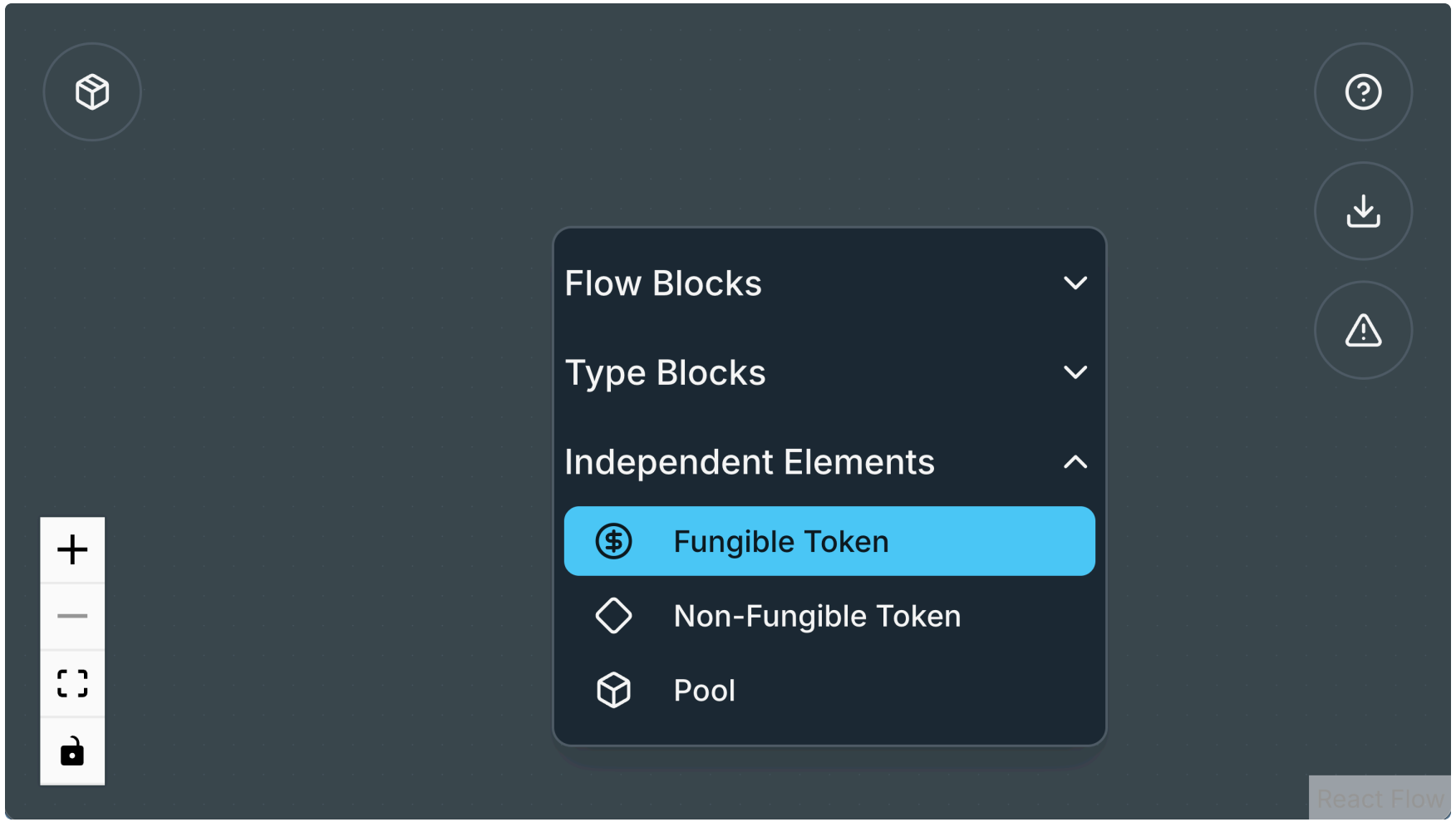
Defined by the user:

- **Variables**
- **Constants**
- **Inputs**

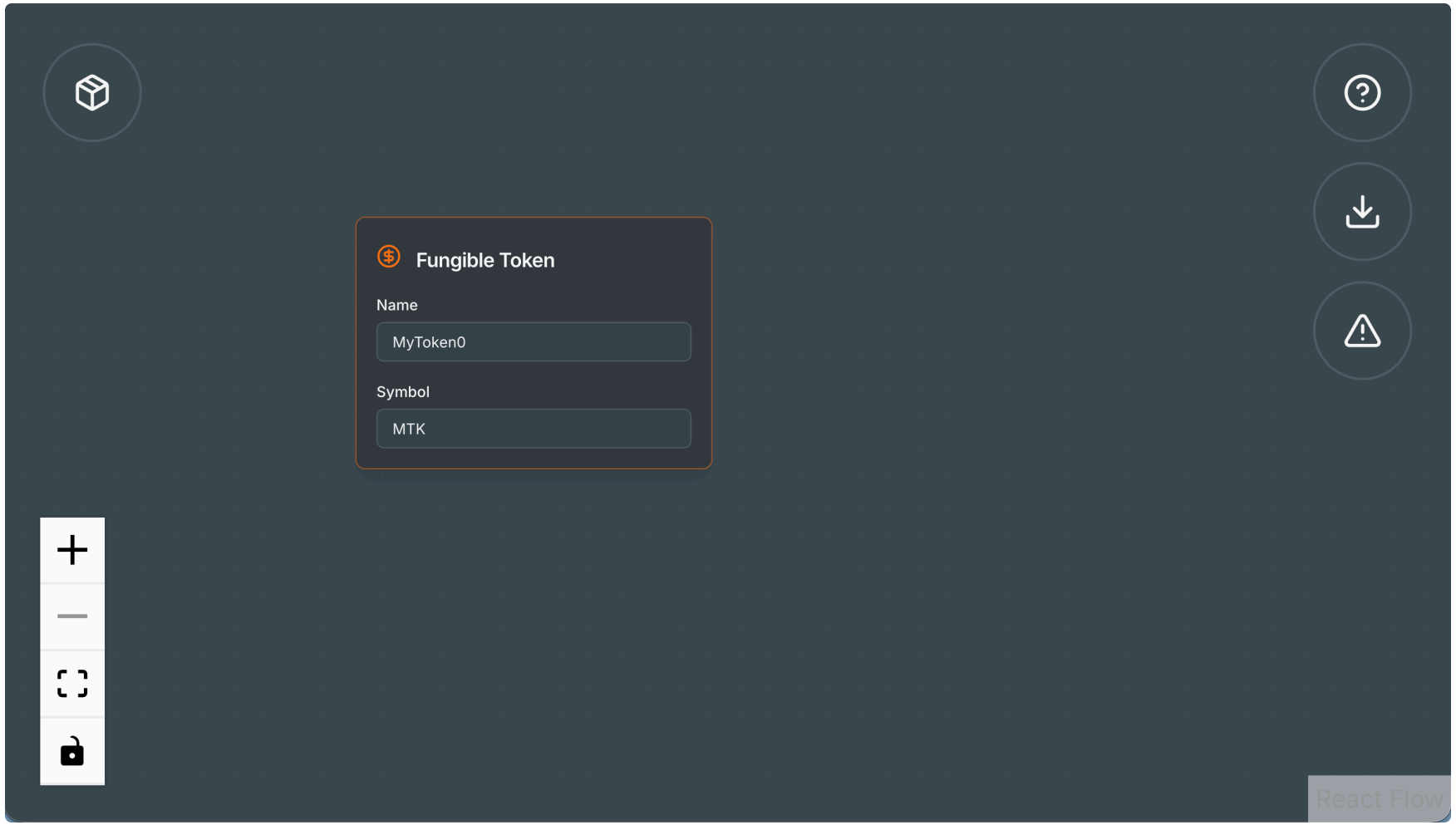
The Editor [1]

[1] The editor is available at https://github.com/simone20a/TATAMI

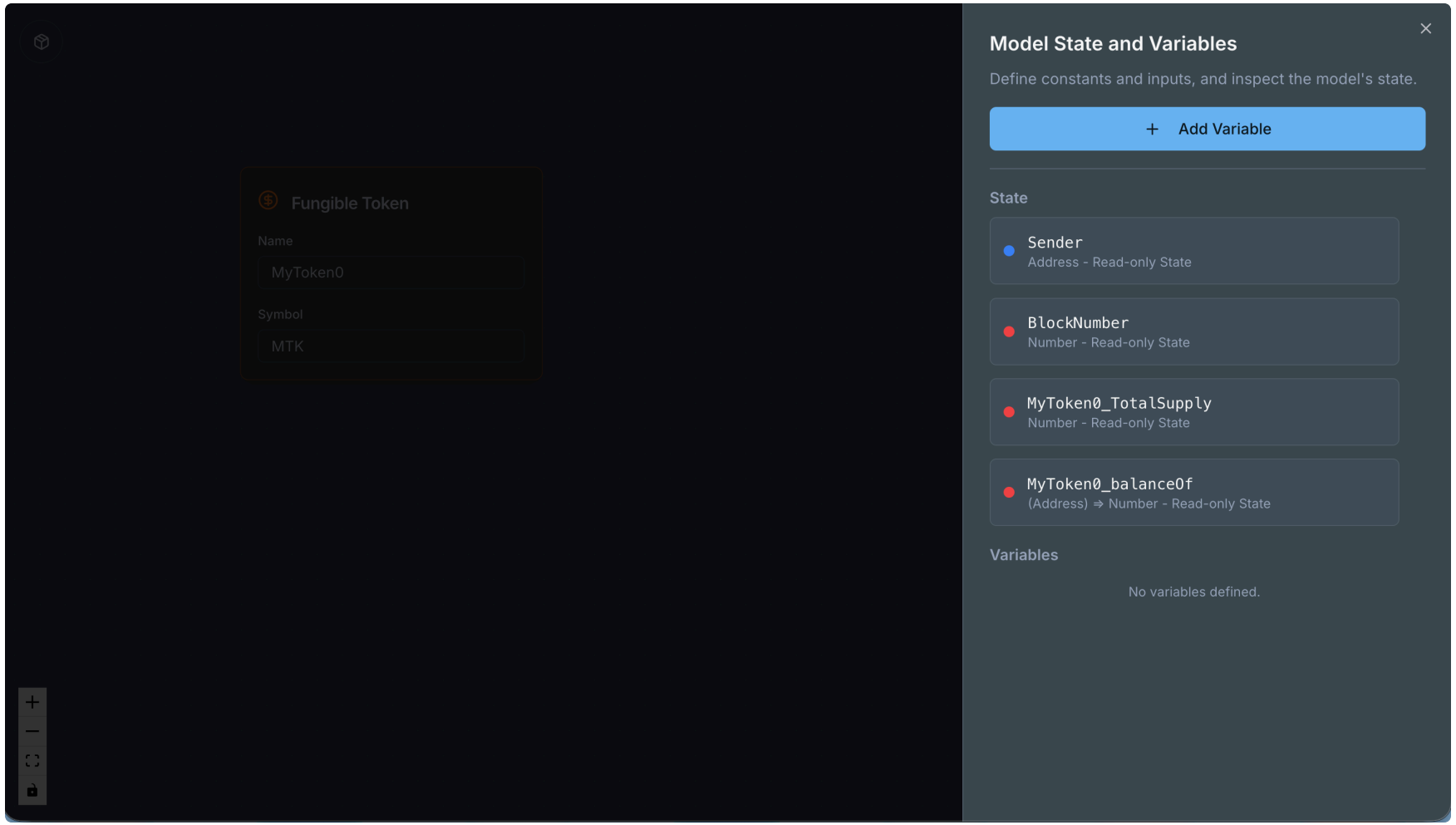
The Editor


Flow Blocks
Type Blocks
Independent Elements
Fungible Token
Non-Fungible Token
Pool
React Flow

The Editor



The Editor


Fungible Token
Name
MyToken0
Symbol
MTK
Model State and Variables
Define constants and inputs, and inspect the model's state.
+ Add Variable
State
Sender
Address - Read-only State
BlockNumber
Number - Read-only State
MyToken0_TotalSupply
Number - Read-only State
MyToken0_balanceOf
(Address) ⇒ Number - Read-only State
Variables
No variables defined.

GOALS

Short Term

- Provide a **formal semantics** to the language using **Abstract State Machines** (ASM)
- Create a **compiler** to ready-to-deploy Solidity code

Long Term

- Explore application of ASMs in **formal verification** of TATAMI models to check:
  - Model Correctness
  - Oversupply Prevention
  - Inflation Spirals Avoidance
  - Burn-Emission Equilibrium

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Thanks