Werkgroep Blockchain

Making in-game items real with blockchain

Menno Bruijn

- Test consultant bij Capgemini
- Gamer, motorrijder en klimmer
- Bezig met blockchain sinds 2014

Ga alvast naar Menti.com
Voer de code in: 55 92 50


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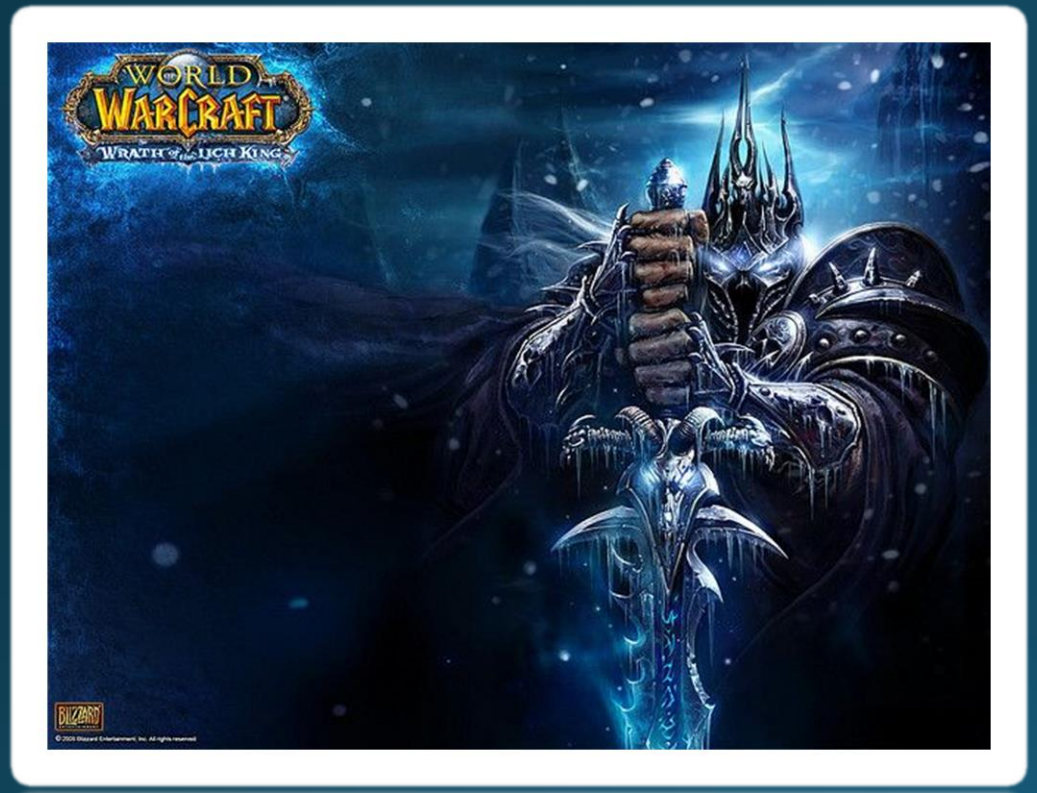


Ga alvast naar Menti.com
Voer de code in: 55 92 50

In de afgelopen jaren

- Markt van in-game items is gegroeid
- Groei van het aantal free to play games
- Groei van het aantal gamers


CALL·DUTY
WARZONE
PLAY
WEAPONS
BATTLE PASS
SEASON 4
OPERATORS
CHALLENGES
BARRACKS
STORE
CyanideX
Rank 58
FEATURED
2D 14H 15M
MULTIPLAYER 6v6
BATTLE ROYALE
AUTO-FILL
SOLO
DUOS
TRIOS
QUADS
PLUNDER
AUTO-FILL
SOLO
DUOS
TRIOS
QUADS
OTHER
WARZONE RUMBLE 50v50 DEATHMATCH
PRACTICE
TRIALS
x24
Mission - High Roller
Daily Challenges
View Challenges
View Tokens
Back
Options


CHALLENGES
1,000
Play 2 games
2/2
3,000
Play 12 games
5/12
3,000
Get 2 knockdowns as Bangalore
2/2
3,000
Outlive 250 opponents
181/250
SEE ALL CHALLENGES
KINGS CANYON - 13 Days 23 Hours
READY


TIER
1
0 / 10
2
OUT OF SEASON
SEASON ENDS: 69 Days
PAGE 1 / 13
1
2
3
4
5
6
7
PURCHASE
You can purchase the Battle Pass to claim all the rewards you've earned.


CROWN ITEM
CROWN ITEM
POTION
Roostertail Frills
(5)
Crown Crate
Experience Scroll
Crown Lesson:
Riding Speed
Crown Tri-Restoration
Potion (5)
Gems: 9
X Back
E Open Storm Atronach Crate (12)
T Buy Crates
Alt Exit

Hoe zet je game items op een blockchain?

- Tokenisation
- Non-fungible tokens
- Tokenstandaarden

Benodigdheden voor tokenisation

Cardownership.sol | Cardgenerator.sol | ownable.sol | ERC721.sol | Migrations.sol

card-game > contracts > Cardgenerator.sol

```
pragma solidity ^0.4.19;

import "./ownable.sol";

contract Cardgenerator is Ownable {

    //Event for new card creation
    event NewCard(uint cardId, uint dna);

    //Parameters to define amount of digits, the modulus and the amount of cards in a start
    address public owner;
    uint dnaDigits = 16;
    uint dnaModulus = 10 ** dnaDigits;
    uint public startingDeck = 10;
    uint public cardPackSize = 5;
    uint public cardPackCost;

    uint public globalCardCount;

    //Card characteristics
    struct Card {
        uint dna;
    }

    //Array of all cards created
    Card[] public cards;

    mapping (uint => address) public cardToOwner;
    mapping (address => uint ) public ownerCardCount;

    //Constructor for setting initial card pack price
    function Cardgenerator() public {
        cardPackCost = 3 ether;
        owner = msg.sender;
    }
```

Cardownership.sol | Cardgenerator.sol | ownable.sol | ERC721.sol | Migrations.sol

card-game > contracts > Cardgenerator.sol

```
30
31      //Constructor for setting initial card pack price
32      function Cardgenerator() public {
33          cardPackCost = 3 ether;
34          owner = msg.sender;
35      }
36
37      //Create a new card by passing dna, assign to msg.sender and trigger New Card even
38      //Card id = position-1 in card array
39      function _createCard(uint _dna) private {
40          uint id = cards.push(Card(_dna)) - 1;
41          cardToOwner[id] = msg.sender;
42          ownerCardCount[msg.sender]++;
43          emit NewCard(id, _dna);
44          globalCardCount++;
45      }
46
47      //Generate (semi)random dna from a string using keccak256 and revert to needed amo
48      function _generateRandomDna(uint _time, uint _nonce) private view returns (uint) {
49          uint hashInput = _time * _nonce;
50          uint rand = uint(keccak256(hashInput));
51          return rand % dnaModulus;
52      }
53
54      //Create a random card when account has no cards
55      //(add randomly generated name based upon cardtype)
56      function createStartingDeck() public {
57          require(ownerCardCount[msg.sender] == 0);
58          uint _nonce = 1;
59          for (uint i = 0; i < startingDeck; i++) {
60              uint randDna = _generateRandomDna(block.timestamp, _nonce);
61              _createCard(randDna);
62              _nonce++;
63              }
64      }
65
66      //Buy cardpacks. Takes (cardPackCost * _amount) in ETH.
```

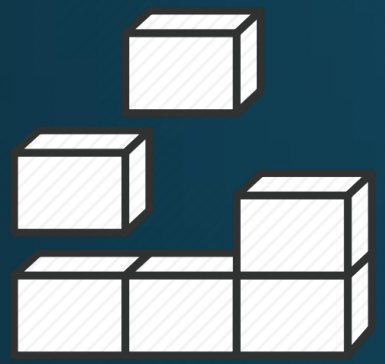
Interpretatie van DNA

- Random hash
- Pak de laatste 10 cijfers
- Pas interpretatie kenmerken toe

Cardownership.sol | Cardgenerator.sol | *ownable.sol* | ERC721.sol | Migrations.sol

card-game > contracts > Cardownership.sol

```sol
pragma solidity ^0.4.19;

import "./Cardgenerator.sol";

contract Cardownership is Cardgenerator {

    event Transfer(address indexed _from, address indexed _to, uint256 _tokenId);
    event Approval(address indexed _owner, address indexed _approved, uint256 _tokenId);
    event ApprovalForAll(address indexed _owner, address indexed _operator, bool _approved);

    mapping (uint => address) cardApprovals;

    modifier onlyOwnerOf(uint _cardId) {
        require(msg.sender == cardToOwner[_cardId]);
        _;
    }

    function balanceOf(address _owner) external view returns (uint256 _balance) {
        return ownerCardCount[_owner];
    }

    function ownerOf(uint256 _tokenId) external view returns (address _owner) {
        return cardToOwner[_tokenId];
    }
// Ga hier verder met ERC721 implementatie
    function _transfer(address _from, address _to, uint256 _tokenId) private {
        ownerCardCount[_to]++;
        ownerCardCount[_from]--;
        cardToOwner[_tokenId] = _to;
        emit Transfer(_from, _to, _tokenId);
    }

    function transfer(address _to, uint256 _tokenId) public onlyOwnerOf(_tokenId) {
        _transfer(msg.sender, _to, _tokenId);
    }

```



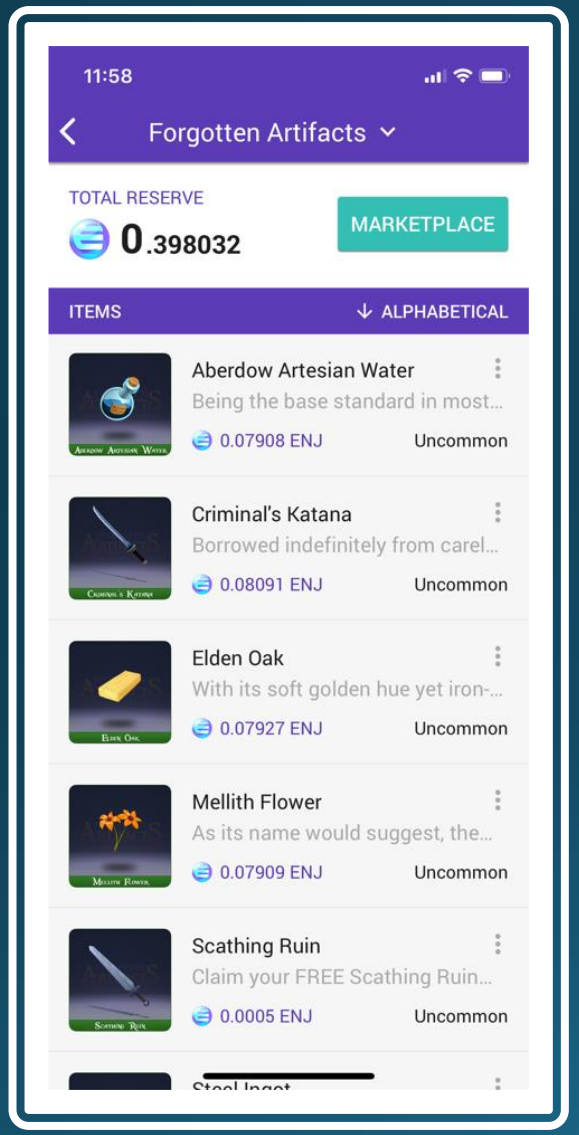
Cardownership.sol | Cardgenerator.sol | *ownable.sol* | ERC721.sol | Migrations.sol

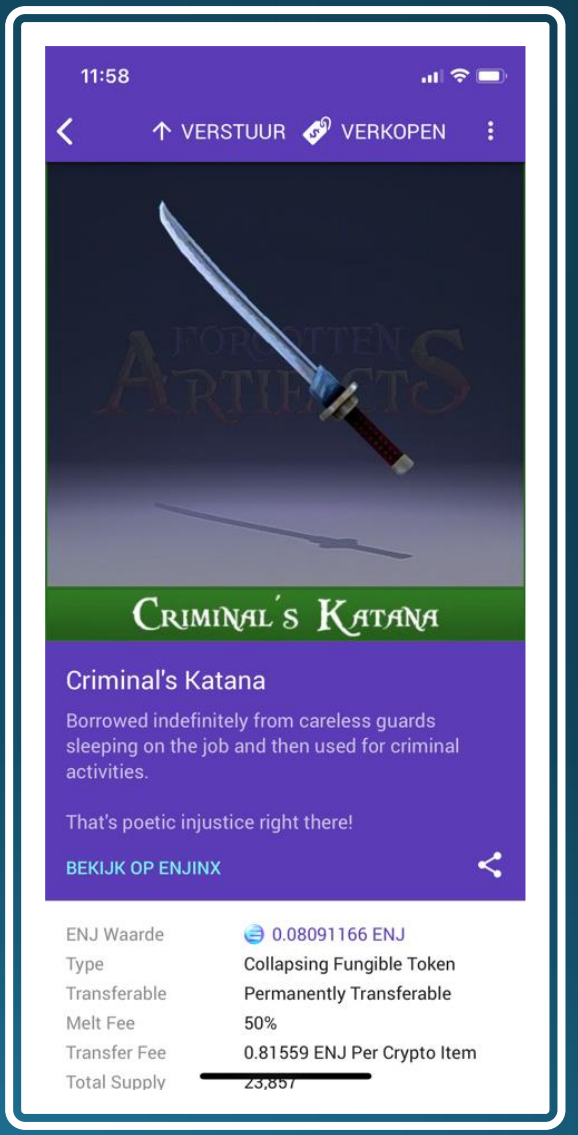
card-game > contracts > ERC721.sol

```sol
pragma solidity ^0.4.19;

contract ERC721 {
    event Transfer(address indexed _from, address indexed _to, uint256 _tokenId);
    event Approval(address indexed _owner, address indexed _approved, uint256 _tokenId);

    function balanceOf(address _owner) public view returns (uint256 _balance);
    function ownerOf(uint256 _tokenId) public view returns (address _owner);
    function transfer(address _to, uint256 _tokenId) public;
    function approve(address _to, uint256 _tokenId) public;
    function takeOwnership(uint256 _tokenId) public;
}
```

Hoe ziet dit eruit met een front end?


16
Fireball
:Pick up item
10
4899


11:58
Forgotten Artifacts
TOTAL RESERVE
0.398032
MARKETPLACE
ITEMS
ALPHABETICAL
Aberdow Artesian Water
Being the base standard in most...
0.07908 ENJ
Uncommon
Criminal's Katana
Borrowed indefinitely from carel...
0.08091 ENJ
Uncommon
Elden Oak
With its soft golden hue yet iron-...
0.07927 ENJ
Uncommon
Mellith Flower
As its name would suggest, the...
0.07909 ENJ
Uncommon
Scathing Ruin
Claim your FREE Scathing Ruin...
0.0005 ENJ
Uncommon


11:58
VERSTUUR
VERKOPEN
CRIMINAL'S KATANA
Criminal's Katana
Borrowed indefinitely from careless guards sleeping on the job and then used for criminal activities.
That's poetic injustice right there!
BEKIJK OP ENJINX
ENJ Waarde
0.08091166 ENJ
Type
Collapsing Fungible Token
Transferable
Permanently Transferable
Melt Fee
50%
Transfer Fee
0.81559 ENJ Per Crypto Item
Total Supply
23,857

Running Blue Man Thesis
Ethereum Kovan

0 / 5,000 Api Hits

1 / 5 Team Members

- General Information
- Assets
- Team
- Plan Details
- Wallet Settings

Wallet 0x1F2DD...36D99

600 KENJ

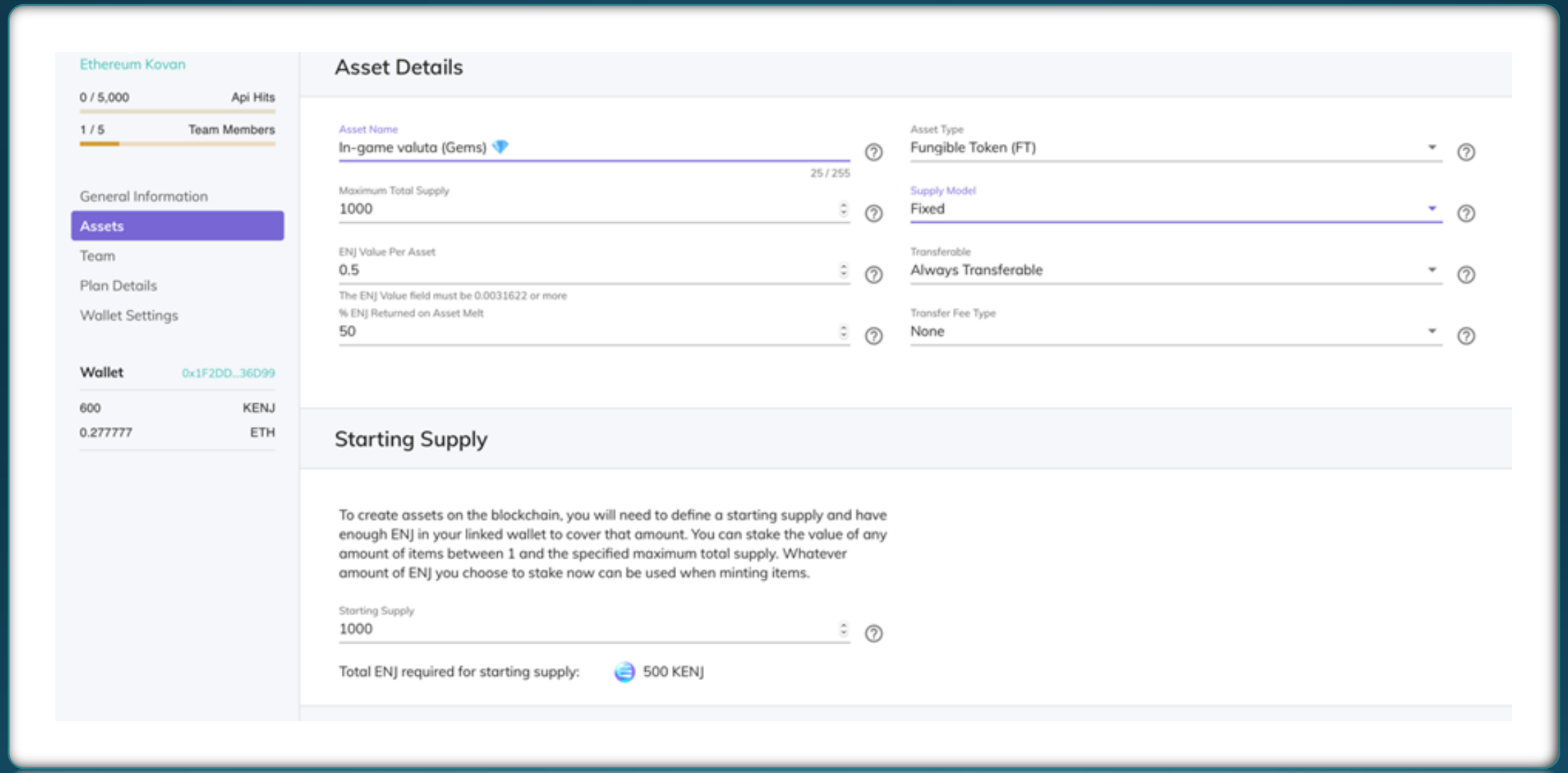
0.277777 ETH

Assets

CREATE ASSET

Search ID or name

Name	Item ID ↓	Type	Reserve	Circ	Supply	Others
In-game currency	7000000000000bca	FT	0	1500	Infinity	Transferable
Capgemini Value #1	188000000000037e	NFT	0	3	10 (Fixed)	Transferable, 10000000


Ethereum Kovan
0 / 5,000
Api Hits
1 / 5
Team Members
General Information
Assets
Team
Plan Details
Wallet Settings
Wallet
0x1F2DD...36D99
600
KENJ
0.277777
ETH
Asset Details
Asset Name
In-game valuta (Gems)
25 / 255
Asset Type
Fungible Token (FT)
Maximum Total Supply
1000
Supply Model
Fixed
ENJ Value Per Asset
0.5
The ENJ Value field must be 0.0031622 or more
Transferable
Always Transferable
% ENJ Returned on Asset Melt
50
Transfer Fee Type
None
Starting Supply
To create assets on the blockchain, you will need to define a starting supply and have enough ENJ in your linked wallet to cover that amount. You can stake the value of any amount of items between 1 and the specified maximum total supply. Whatever amount of ENJ you choose to stake now can be used when minting items.
Starting Supply
1000
Total ENJ required for starting supply:
500 KENJ

Platform Assets

Search transactions, addresses, blocks, coins, assets, and platforms

DETAILS

MARKET

TXNS

INFO ASSETS HODLERS

Age of Rust

33 (29,399,214) Assets

Canto's Private Keys FT

Age of Rust 20,000 ENJ

Arjen's Holo drive FT

Age of Rust 12,000 ENJ

Ankh Artifact FT

Age of Rust 999.9999 ENJ

Origin FT

Age of Rust 650 ENJ

Isolationists Mask FT

Age of Rust 200 ENJ

Mech Source Code FT

Age of Rust 200 ENJ

Ununpentium FT

Age of Rust 100 ENJ

Lastlight FT

Age of Rust 100 ENJ

Portable Fold Gate FT

Age of Rust 50 ENJ

Resistance Radio FT

Age of Rust 50 ENJ

Toekomstmogelijkheden

- Bewijsbaar unieke game-items
- Dezelfde game-items interpreteerbaar door verschillende games
- Items buiten games verhandelbaar
- Spelers worden écht eigenaar