

University at Buffalo
Department of Computer Science and Engineering
CSE 526 - Blockchain Application Development
Fall 2023

Phase 1

Cloud-as-a-Blockchain (Caab)

Parth Rajkumar Sonkhia psonkhia@buffalo.edu 50468258
Anuj Sheetalkumar Vadecha anujshee@buffalo.edu 50481846

Approved by TA : Baibhav Thapa

1) Issues Addressed:

1. **Token Representation of Virtual Machines or Cloud services** in terms of money is complicated in today's world. If a storage and a configuration (Processors, RAM e.t.c) can be represented with tokens then it will become easy to compare across all cloud providers as well as more benefits of a decentralized cloud configuration management mentioned below.
2. **Comparision of cloud services:** - Comparision across different services and values in terms of tokens can help increase visibility on the platform in terms of tokens. No need for cost explorers or budget planners.
3. **Security:** - Privacy and data protection in terms of cloud providers is a must and immutability with a distributed architecture would be an advantage when it comes to protection from attacks as well as confusion with payment systems or middlemen.
4. **Interoperability** - Using standardized ERC tokens allows your storage platform to be compatible and interoperable with other decentralized applications and wallets.

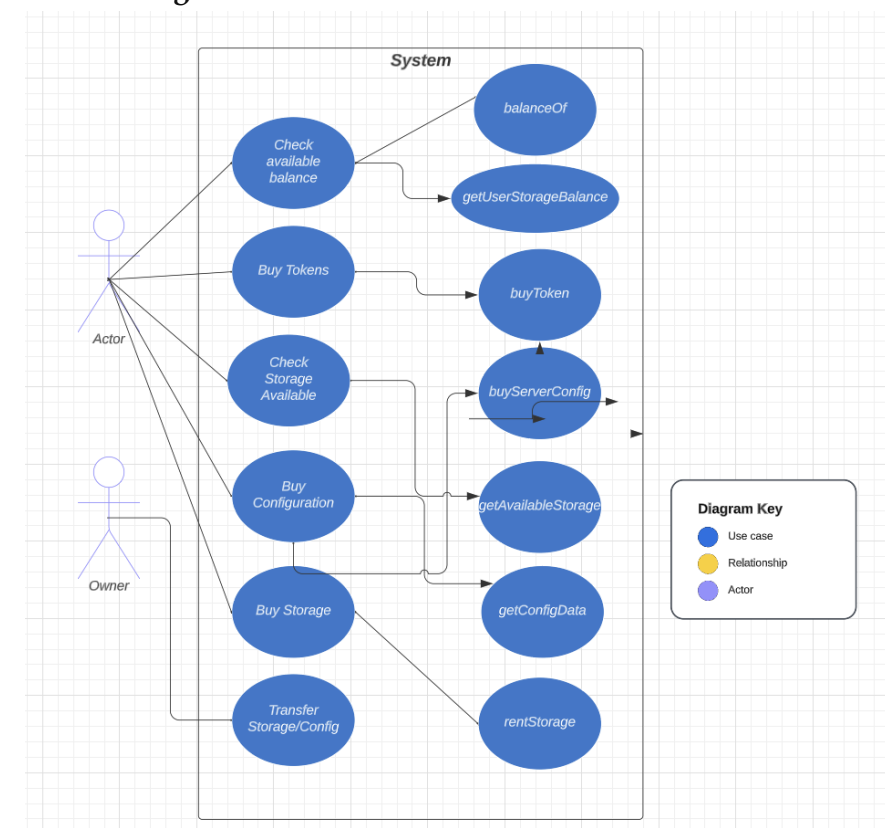
5. **Ownership** - ERC-721 NFTs and ERC-1155 tokens give explicit digital ownership of storage assets, rather than opaque licenses.
6. **Scarcity** - NFTs like ERC-721 impose artificial scarcity which can be useful for managing limited storage resources.
7. **Incentives** - Tokens permit implementing staking rewards or slashing penalties to incentivize good behavior.

2] Abstract: Cloud Infrastructure Tokenized


Centralized cloud platforms exhibit lack of interoperability, vendor lock-in, and limited verifiability of resource ownership. Users cannot easily transfer workloads across clouds nor audit allocated configurations. The opacity of resource management disempowers clients and disconnects providers from infrastructure operations. This project enables an open cloud computing marketplace by representing hardware and software assets on a public blockchain using ERC token standards. Recording machine configurations as verifiable, transferable tokens solves the problem of resource allocation. It creates transparency between clients, providers, and operators, aligning incentives and granting end-users control over deployment and consumption of modular cloud services.

This is going to be a POC of the future of cloud services on web3 to be able to demonstrate buying of storage as well as configurations for virtual machines in the cloud, the products name is Cloud as a Blockchain.

Use case Diagram



Wireframe



Wallet address

02xFFasdasdfewdqweqecncjed

Your Resources

Available Balance

50 CST
11 CCT
10 CAB

CST used

15

CAB Used

5

Buy Tokens

CST CCT CAB

Number of tokens

Buy

Buy Cloud Resources

Storage Configuration

Number of GBS 50gb = 10 tokens

Get

3] Tokens:

As a part of this project we introduce 3 tokens , details are as follows

Token Name	Protocols	Description/Reasoning
CST (Cloud Storage Token)	<u>ERC 20</u>	ERC20 tokens are fungible and represent a uniform asset. Storage is a uniform asset and can be represented using ERC20 . Each CST 1 token will be eligible to buy 5gb of disk storage The overall limit of storage available will be set by the owner of the cloud storage space
CCT (Cloud Config Token)	<u>ERC 721</u>	ERC721 tokens are non-fungible and symbolize a set of unique assets. Cloud

		<p>configs can symbolize the different configurations like GPU, Processor, RAM, Cores, OS .</p> <p>Each new token will have inputs to initialize a specific Non Fungible token which can be created and bought for the user.</p>
CAB (Cloud as Blockchain)	<u>ERC 1155</u>	<p><u>ERC 1155</u> Will symbolize a complete configuration combining both storage as well as cloud configurations.</p> <p>This token when created will be a multitoken which will be a combination of Storage as well as Cloud Configuration.</p>

References

- **Blockchain In Action Book by Prof. Bina Ramamurthy**
- **ERC Token Tutorial**
Author: [Unknown] **URL:** <https://www.toptal.com/ethereum/create-erc20-token-tutorial>
- **ERC 721 Fix** Author: [Unknown] URL:
<https://www.quicknode.com/guides/ethereum-development/nfts/how-to-create-and-deploy-an-erc-721-nft>
- **OpenZeppelin Documentation**
ERC1155: <https://docs.openzeppelin.com/contracts/3.x/api/token/erc1155#ERC1155>
ERC1155 Overview: <https://docs.openzeppelin.com/contracts/3.x/erc1155>
ERC721: <https://docs.openzeppelin.com/contracts/3.x/api/token/erc721#ERC721>
ERC20: <https://docs.openzeppelin.com/contracts/3.x/api/token/erc20#ERC20-approve-address-uint256->
ERC20 Overview: <https://docs.openzeppelin.com/contracts/3.x/erc20>
ERC721 Overview: <https://docs.openzeppelin.com/contracts/3.x/erc721>
- **Solidity Tutorials**
ERC1155: <https://solidity-by-example.org/app/erc1155/>
ERC721: <https://solidity-by-example.org/app/erc721/>
ERC20: <https://solidity-by-example.org/app/erc20/>
- **Stack overflow**

<https://ethereum.stackexchange.com/>