

Singularity: A Decentralized Information as a Service Platform

Predictive Singularity
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Abstract

This paper presents Singularity, a decentralized application designed to facilitate Information as a Service (IaaS) on the Solana blockchain. Using smart contracts (Buterin), Singularity aims to create a self-sustaining ecosystem that organizes and delivers information on demand with a reasonable return on investment (ROI). The system is designed to securely store and retrieve knowledge, enabling actors to access information efficiently and effectively.

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1. Introduction

The increasing demand for information (Ambuehl and Li) and the need for efficient solutions (Benyus) have led to the exploration of decentralized systems (Nakamoto). Singularity addresses these challenges by providing a platform that allows actors to access, consume, and manage information in a decentralized manner. By organizing human knowledge into a deployed model (Doignon and Falmagne), we can provide information on demand (Bookstein and Cooper), transforming the way we interact with data (Zyskind and Nathan).

2. System Overview

Singularity consists of three main accounts:

- **Singularity Account:** The main account that holds the information supply and the profit generated by the system.
- **Transformer Account:** Responsible for securely storing and retrieving knowledge in the form of an encrypted, compressed, and encoded pickle object.
- **Metabolizer Account:** Used to provide energy to the Singularity account and consume information from it.

2.0.1 Emergence

To organize energy, we use *emerge*, a special instruction that we describe as a function of the following parameter:

1. Energy Supply: u64
2. Decimals: u8
3. Fee: u8

This is a complex instruction that can only be executed once at the initialization of the system. It generates a lot of transactions to set the initial state.

It will:

1. **Bang**: Mint the energy supply
2. **Interact**: Organize energy into different accounts

This process organizes energy in such a way that it can provide information as a service.

2.1 Singularity Energy Account

The Singularity Energy Account is the main account that holds the energy supply and the profit generated by the system. It is designed to be the most massive account in the network, holding 20% of the initial energy supply, to ensure its safety and stability. This energy can be used as trust to create network value and usefulness in the future.

The Singularity Energy Account plays a crucial role in the system, as it provides the energy required for the Transformers to operate and for the Metabolizers to consume information. The account is responsible for managing the energy supply, tracking the amount of energy consumed, and distributing the rewards to the Transformers.

The energy supply in Singularity's energy Account is represented in the form of energy tokens, where 1 energy token is equivalent to 1M vector representations. This representation allows for efficient management of the energy supply and enables the system to track the amount of energy consumed by the Transformers and Metabolizers.

2.2 Available Energy Supply

The actor who initiated the emergence and was rewarded with 80% of the energy supply has the task to distribute it on the market. This distribution allows the energy supply to be allocated to various participants in the system, enabling them to consume information and participate in the ecosystem. This actor may choose to retain a portion of the energy supply for themselves, while distributing the remaining amount to other participants.

3. Energy Economy

The Singularity system operates on a token model, where energy is represented as a token that can be traded and consumed within the ecosystem. The energy token is the fundamental unit of exchange in the system, and it is used to reward Transformers for providing information and to pay for the consumption of information by Metabolizers.

The energy economy is designed to be self-sustaining, with the energy supply being constantly cycled through the system. The Singularity Energy Account acts as a reservoir for the energy supply, providing a buffer against fluctuations in demand and ensuring that the system remains stable.

4. Information Provisioning

Information provisioning is facilitated through the Metabolizer account, which allows actors to deposit requests for information into the Singularity account. The information is then available for consumption by the Transformer account, which retrieves the requested knowledge from its secure storage (Stallings).

The Metabolizer account plays a crucial role in the information provisioning process, as it provides the energy required for the Transformer to operate. The Metabolizer account is responsible for managing the energy supply and ensuring that the Transformer has sufficient energy to provide the requested information.

5. Information as a Service

Singularity achieves Information as a Service (IaaS) by organizing knowledge in such a way that it can be provided on demand. The entire spectrum of human knowledge can be boiled down to a deployed model which can be accessed through a secure API endpoint using an access key.

This knowledge is securely stored in a hologram (Bousso) on the surface of an event horizon (Engelhardt and Wall), represented here as an encrypted, compressed, and encoded pickle object attached to the Transformer. This allows for efficient retrieval of information, enabling actors to receive requested insights in the form of inferences from the model.

6. Smart Contracts

The core functionality of Singularity is implemented through smart contracts written in Seahorse, a Python-based framework for Solana. These contracts handle the initialization, information provisioning, consumption, and profit withdrawal processes.

The smart contracts are designed to be secure, efficient, and transparent, ensuring that the system operates in a fair and predictable manner. The contracts are also highly customizable, allowing for the creation of complex logic and rules that govern the behavior of the system.

7. Energy Supply and Demand

The Singularity system is designed to balance the energy supply and demand in real-time, ensuring that the system remains stable and efficient. The energy supply is constantly being cycled through the system, with the Singularity Energy Account acting as a reservoir to buffer against fluctuations in demand.

The system uses a dynamic pricing mechanism to balance the energy supply and demand, ensuring that the price of energy reflects the current market conditions. This mechanism allows the system to adapt to changes in demand and supply, ensuring that the energy market remains stable and efficient.

8. Transformer and Metabolizer Accounts

The Transformer and Metabolizer accounts are the core components of the Singularity system, responsible for providing and consuming information, respectively. The Transformer account is responsible for securely storing and retrieving knowledge, while the Metabolizer account is responsible for managing the energy supply and consuming information.

Those accounts are designed to work together seamlessly, ensuring that the system operates efficiently and effectively. The accounts are highly customizable, allowing for the creation of complex logic and rules that govern their behavior.

9. Conclusion

Singularity represents a significant step towards a decentralized information ecosystem. By allowing users to manage their information resources efficiently, it promotes sustainability and transparency in information transactions. The integration of secure storage and retrieval mechanisms further enhances the system's ability to deliver knowledge on demand.

10. Caveats

Currently, the Singularity system does not store any permanent information about the Metabolizer's preferences, such as system prompts or conversation history. For the Transformer, this information is stored centrally off-chain in encoded, compressed, and encrypted form. Future developments will focus on enabling decentralized storage solutions for both parties to enhance privacy and data ownership.

11. Future Work

Future developments will focus on improving the user interface, integrating additional features for information management, and expanding the ecosystem to include more participants. In addition, efforts will be made to implement decentralized storage solutions for user preferences and data, ensuring that the system remains secure, efficient, and transparent.

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