ANASTASIA LABS

Data Structures Closeout Report

Name of project: Anastasia Labs - The Trifecta of Data Structures: Merkle Trees, Tries, and Linked Lists for Cutting-Edge Contracts.
Project url: https://projectcatalyst.io/funds/10/f10-osde-open-source-dev-ecosystem/anastasia-labs-the-trifecta-of-data-structures-merkle-trees-tries-and-linked-lists-for-cutting-edge-contracts
Project Number: 1000013
Project manager: Jonathan Rodriguez
Project Start Date: 2023-10-08
Project End Date: 2024-04-09
List of challenge KPIs and how the project addressed them:

- **Insufficient on-chain data structures hindering scalability of Cardano:** Implemented Merkle trees, Tries, and Linked Lists in both Aiken and Plutarch to provide efficient and scalable data structures for Cardano smart contracts.
- **Limited 16kb Tx size and single UTXO per application:** Leveraged the EUTXO model and minting policies to create distributed data structures that can span multiple UTXOs, enabling larger and more complex smart contract applications.

List of project KPIs and how the project addressed them:

- **Provide generic and production-ready implementations:** Developed robust, optimized, and well-tested implementations of Merkle trees, Tries, and Linked Lists in both Aiken and Plutarch.
- **Ensure robustness through testing:** Implemented comprehensive unit tests to validate the correctness and reliability of the data structures.
- **Make the project fully open-source:** All developed code and documentation have been made publicly available under an MIT license.

Key achievements (in particular around collaboration and engagement):

- Successful implementation of Merkle trees, Tries, and Linked Lists in both Aiken and Plutarch, providing the Cardano developer community with advanced and scalable data structures.
- Extensive documentation and tutorials to help other developers understand and utilize these data structures in their Cardano projects.

- Collaboration with the Lenfi team to integrate the Linked List implementation into their governance solutions.

Key learnings:

Next steps for the product or service developed:

Final thoughts/comments:

Links to other relevant project sources or documents:

- **Project Repository:** https://github.com/Anastasia-Labs/data-structures
- **Plutarch:**
  1. Merkle trees: https://github.com/Anastasia-Labs/plutarch-merkle-tree
  2. Linked Lists: https://github.com/Anastasia-Labs/plutarch-linked-list
  3. Tries: https://github.com/Anastasia-Labs/plutarch-trie
- **Aiken:**
  1. Merkle trees: https://github.com/Anastasia-Labs/aiken-merkle-tree
  2. Linked Lists: https://github.com/Anastasia-Labs/aiken-linked-list
  3. Tries: https://github.com/Anastasia-Labs/aiken-trie

Link to Close out video: