

Mamori Written Task

The purpose of this task is to help candidates understand the scope of Mamori and familiarize them with the type of task they would have after on-boarding. The goal is to align the interest between the candidate and Mamori development.

A. Research in Methodology

You're developing an algorithm to detect the type of vulnerability similar to KyberSwap Exploit (22 Nov 2023). Suggest a prospective algorithm (s) with reference provided. Free feel to delve into technical details and be innovative, while keeping your explanation clear and understandable to our team.

Candidate is expected to explain the following:

- a) Own understandings of the major challenges to detect the exploit
- b) Summary of the algorithm
- c) Rationale behind using the algorithm
- d) Core limitations
- e) Core advantage
- f) How to evaluate the effectiveness of the algorithms

Useful information to understand the background of the exploit:

- [Post Mortem: KyberSwap Elastic Exploit](#)
- [DeFi Hacks Labs Code](#)

B. Smart Contract Exploit

- a. Read the "*Sample_Exploit.sol*" file and identify the 1) type of exploit category, 2) root-cause and 3) create a short version of post-mortem to explain the exploit.
- b. Is your algorithm proposed above able to detect the exploit? Why or why not?

C. Open-source library

You're searching for a method to implement the discrete optimization part in the Mamori whitepaper. One of the core ideas is to observe the read and write relationship between functions and formulate the action sequence. The goal is to find a library to help on sequence invocation. Feel free to utilize AI tools for considerations such as performance and feature

flexibility and justify your evaluations.

Please concentrate on the implementation and share your insights, limitations and advantages of the following libraries to achieve the goal:

- a. [evm-dis](#)
- b. [Heimdall-rs](#)
- c. (Bonus) Propose alternative solutions to reduce the discrete search space.
- d. (Bonus) Suggest scenarios where these libraries could be effectively applied.

D. Criteria for Value Execution

Compare the following nature of value extraction and explain the core limitations of solving each problem.

- a. MEV searching
- b. Intent solving
- c. Routing
- d. OEV searching

Candidate is expected to give a short and precise answer based on their own thoughts. (Bonus)
The candidate is able to draw the similarities and differences between these types of value extractions.

E. Research Presentation

In the second round Interview: I'd love to invite you to present the paper of [sFuzz2.0.: Storage-access pattern guided Smart Contract Fuzzing](#). The goal of the presentation is to learn the insights and methodology from the academic paper and improve Mamori's value extraction system. On top of presenting a standard overview and components needed of an academic paper, candidate is expected to provide:

- a. How could it be beneficial / value-added to Mamori from your point of view? (Be creative and innovative)
- b. What are the potential relevant papers that would be in your pending reading list?