Smart Contract Security Audit Report

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1 Executive Summary

On 2024.12.03, the SlowMist security team received the Particle team's security audit application for particle-solana-mpl-bank, developed the audit plan according to the agreement of both parties and the characteristics of the project, and finally issued the security audit report.

The SlowMist security team adopts the strategy of "white box lead, black, grey box assists" to conduct a complete security test on the project in the way closest to the real attack.

The test method information:

Test method	Description
Black box testing	Conduct security tests from an attacker's perspective externally.
Grey box testing	Conduct security testing on code modules through the scripting tool, observing the internal running status, mining weaknesses.
White box testing	Based on the open source code, non-open source code, to detect whether there are vulnerabilities in programs such as nodes, SDK, etc.

The vulnerability severity level information:

Level	Description
Critical	Critical severity vulnerabilities will have a significant impact on the security of the DeFi project, and it is strongly recommended to fix the critical vulnerabilities.
High	High severity vulnerabilities will affect the normal operation of the DeFi project. It is strongly recommended to fix high-risk vulnerabilities.
Medium	Medium severity vulnerability will affect the operation of the DeFi project. It is recommended to fix medium-risk vulnerabilities.
Low	Low severity vulnerabilities may affect the operation of the DeFi project in certain scenarios. It is suggested that the project party should evaluate and consider whether these vulnerabilities need to be fixed.
Weakness	There are safety risks theoretically, but it is extremely difficult to reproduce in engineering.
Suggestion	There are better practices for coding or architecture.

2 Audit Methodology

The security audit process of SlowMist security team for smart contract includes two steps:

Smart contract codes are scanned/tested for commonly known and more specific vulnerabilities using automated analysis tools.

Manual audit of the codes for security issues. The contracts are manually analyzed to look for any potential problems.

Following is the list of commonly known vulnerabilities that was considered during the audit of the smart contract:

- Reentrancy Vulnerability
- Replay Vulnerability
- Reordering Vulnerability
- Denial of Service Vulnerability
- Transaction Ordering Dependence Vulnerability
- Race Conditions Vulnerability
- Authority Control Vulnerability
- Integer Overflow and Underflow Vulnerability
- TimeStamp Dependence Vulnerability
- Unsafe External Call Audit
- Design Logic Audit
- Scoping and Declarations Audit
- Account substitution attack Audit
- Malicious Event Log Audit

3 Project Overview

3.1 Project Introduction

The L1 Unifying All Chains Through Universal Accounts.

3.2 Vulnerability Information

The following is the status of the vulnerabilities found in this audit:

NO	Title	Category	Level	Status
N1	`environment` parameter forgery	Authority Control Vulnerability Audit	Low	Acknowledged
N2	Payer has excessive privileges.	Authority Control Vulnerability Audit	Medium	Acknowledged

4 Code Overview

4.1 Contracts Description

https://github.com/Particle-Network/particle-solana-mpl-bank

commit: 949e724cad7cfe9042588cbc07142da9ec404516

The main network address of the contract is as follows:

The code was not deployed to the mainnet.

4.2 Visibility Description

The SlowMist security team analyzed the visibility of major contracts during the audit, the result as follows:

bank			
Function Name	Account check coverage	Auth Signer	Params Check
deposit_sol	5/5	payer/sourcer	2/2
deposit_token	9/9	payer/sourcer	2/2
deposit_token_2022	9/9	payer/sourcer	2/2
release_sol	4/4	payer	2/2
release_token	9/9	payer	2/2

bank			
release_token_2022	9/9	payer	2/2
exchange_token	12/12	payer/sourcer	2/2
print_payer_balance	-	-	-

4.3 Vulnerability Summary

[N1] [Low] `environment` parameter forgery

Category: Authority Control Vulnerability Audit

Content

In the execute method, call permissions are controlled by checking the key of the payer.

```
pub fn execute(ctx: Context<Self>, args: DepositSolArgs) -> Result<()> {
    //...
    check_control_key(ctx.accounts.payer.key, args.environment)?;
```

However, the `args.environment` parameter is used to indicate whether the key is used in the test environment or the production environment, then the test environment key can be invoked against the main network contract by modifying the `args.environment` to zero.

- particle-solana-mpl-bank/programs/particle-solana-mpl-bank/src/utils/common.rs

```
pub fn check_control_key(key: &Pubkey, environment: u8) -> Result<()> {
    if environment == 0 {
        require!(key == &CONTROL_KEY_DEBUG, BankError::InvalidControlKey);
    } else {
        require!(key == &CONTROL_KEY_PRODUCTION, BankError::InvalidControlKey);
    }


    Ok(())
}
```

Solution

Instead of using parameter passing, parameters are used at compile time to distinguish between test and production

nets.

Status

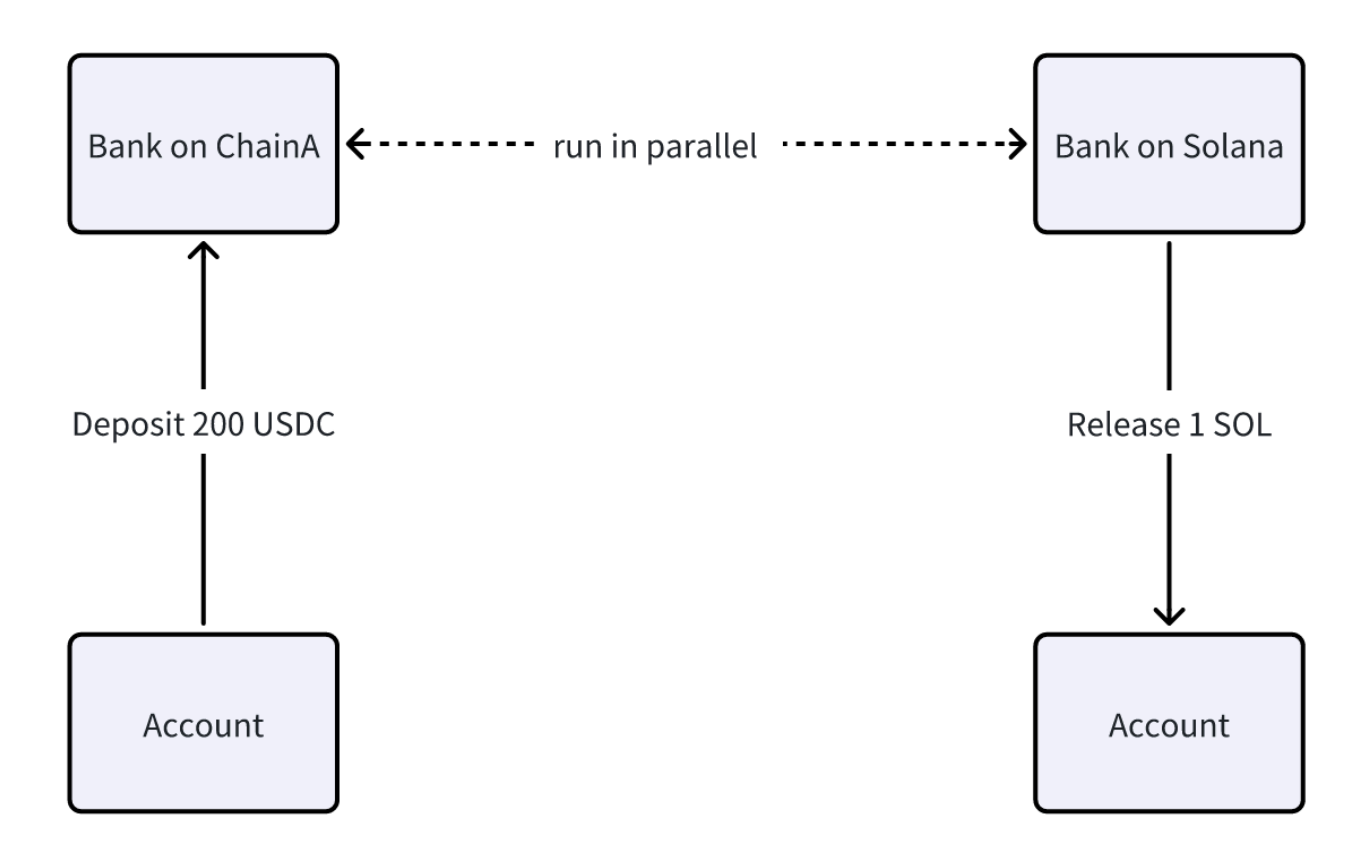
Acknowledged

[N2] [Medium] Payer has excessive privileges.

Category: Authority Control Vulnerability Audit

Content

In a cross-chain release call, the payer has full access to withdraw funds from the vault, which is too much access for a decentralized blockchain system, and the private key of the payer may be stolen or used illegally.



Code location:

- particle-solana-mpl-bank/programs/particle-solana-mpl-bank/src/instructions/release_sol.rs
- particle-solana-mpl-bank/programs/particle-solana-mpl-bank/src/instructions/release_token_2022.rs
- particle-solana-mpl-bank/programs/particle-solana-mpl-bank/src/instructions/release_token.rs

Solution

In the short term, transferring owner ownership to multisig contracts is an effective solution to avoid single-point risk.

But in the long run, it is a more reasonable solution to implement a privilege separation strategy and set up multiple privileged roles to manage each privileged function separately. And the authority involving user funds should be managed by the community, and the authority involving emergency contract suspension can be managed by the EOA address. This ensures both a quick response to threats and the safety of user funds.

Status

Acknowledged; The project party will use MPC technology to ensure the security of private keys in the future.

5 Audit Result

Audit Number	Audit Team	Audit Date	Audit Result
0X002412060008	SlowMist Security Team	2024.12.03 - 2024.12.06	Medium Risk

Summary conclusion: The SlowMist security team use a manual and SlowMist team's analysis tool to audit the project, during the audit work we found 1 medium risk, 1 low risk vulnerabilities.

6 Statement

SlowMist issues this report with reference to the facts that have occurred or existed before the issuance of this report, and only assumes corresponding responsibility based on these.

For the facts that occurred or existed after the issuance, SlowMist is not able to judge the security status of this project, and is not responsible for them. The security audit analysis and other contents of this report are based on the documents and materials provided to SlowMist by the information provider till the date of the insurance report (referred to as "provided information"). SlowMist assumes: The information provided is not missing, tampered with, deleted or concealed. If the information provided is missing, tampered with, deleted, concealed, or inconsistent with the actual situation, the SlowMist shall not be liable for any loss or adverse effect resulting therefrom. SlowMist only conducts the agreed security audit on the security situation of the project and issues this report. SlowMist is not responsible for the background and other conditions of the project.

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