VRust

Security Assessment

O2Lab VRust Team

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Contents

Summary

This report has been prepared for O2Lab VRust Team to discover issues and vulnerabilities in the source code of the O2Lab VRust Team project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review techniques. The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

Overview

Project Summary

Project Name	O2Lab VRust Team
Platform	Ethereum
Language	Solana
Crate	spl_token_swap
GitHub Location	https://github.com/parasol-aser/vrust
sha256	Unknown

Audit Summary

Delivery Date	11/04/2022
Audit Methodology	Static Analysis
Key Components	

Vulnerability Summary

Vulnerability Level	Total
Critical	5
Major	0
Medium	0
Minor	0
Informational	0
Discussion	0

Findings

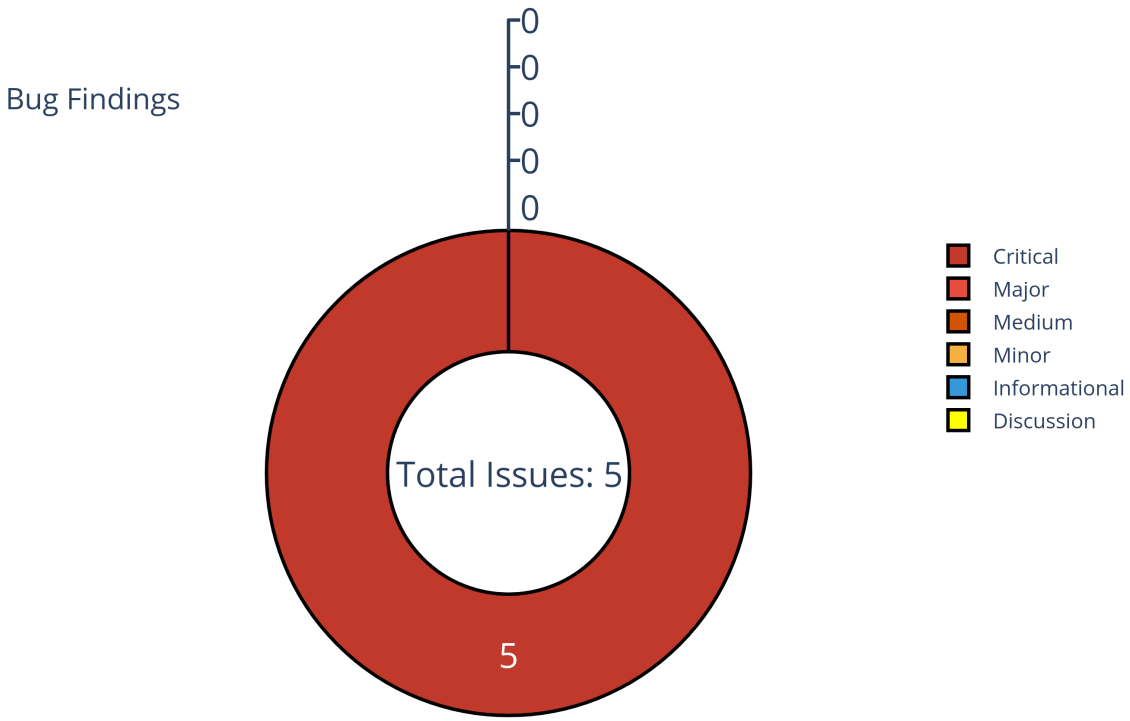

Figure 1: Findings

Finding Statistic

Category	Count
MissingKeyCheck	5

ID	Category	Severity	Status
0	MissingKeyCheck	Critical	UnResolved
1	MissingKeyCheck	Critical	UnResolved
2	MissingKeyCheck	Critical	UnResolved
3	MissingKeyCheck	Critical	UnResolved
4	MissingKeyCheck	Critical	UnResolved

Issue: 0: MissingKeyCheck

Category	Severity	Status
MissingKeyCheck	Critical	UnResolved

- Location

token-swap/program/src/processor.rs:867:47: 867:70

```
867 swap_info.data.borrow()
868
```

- Code Context

Vulnerability at Line: 867

```
862         let swap_token_b_info = next_account_info(account_info_iter)?;
863         let destination_info = next_account_info(account_info_iter)?;
864         let pool_fee_account_info = next_account_info(account_info_iter)?;
865         let token_program_info = next_account_info(account_info_iter)?;
866
867         let token_swap = SwapVersion::unpack(&swap_info.data.borrow())?;
868         let destination_account =
869             Self::unpack_token_account(destination_info,
                ↪  token_swap.token_program_id())?;
870         let swap_token_a =
871             Self::unpack_token_account(swap_token_a_info,
                ↪  token_swap.token_program_id())?;
872
```

- Call Stack

```
1 fn entrypoint::entrypoint(){// /home/yifei/.cargo/registry/src/github.com-
  ↪  1ecc6299db9ec823/solana-program-1.9.9/src/entrypoint.rs:120:9: 127:10
  ↪  }
2     fn entrypoint::process_instruction(){//
       ↪  token-swap/program/src/entrypoint.rs:10:1: 21:2 }
3         fn processor::Processor::process(){//
           ↪  token-swap/program/src/processor.rs:988:5: 990:6 }
4             fn processor::Processor::process_with_constraints(){//
               ↪  token-swap/program/src/processor.rs:993:5: 1069:6 }
```

```
fn proces-
↪  sor::Processor::process_withdraw_single_token_type_exact_amount_
↪  token-swap/program/src/processor.rs:849:5: 985:6 }
```

- description:
- link:
- alleviation:

Issue: 1: MissingKeyCheck

Category	Severity	Status
MissingKeyCheck	Critical	UnResolved

- Location

token-swap/program/src/processor.rs:746:47: 746:70

```
746 swap_info.data.borrow()
747
```

- Code Context

Vulnerability at Line: 746

```
741         let swap_token_b_info = next_account_info(account_info_iter)?;
742         let pool_mint_info = next_account_info(account_info_iter)?;
743         let destination_info = next_account_info(account_info_iter)?;
744         let token_program_info = next_account_info(account_info_iter)?;
745
746         let token_swap = SwapVersion::unpack(&swap_info.data.borrow())?;
747         let calculator = &token_swap.swap_curve().calculator;
748         if !calculator.allows_deposits() {
749             return Err(SwapError::UnsupportedCurveOperation.into());
750         }
751
```

- Call Stack

```
1 fn entrypoint::entrypoint(){// /home/yifei/.cargo/registry/src/github.com-
  ↪ 1ecc6299db9ec823/solana-program-1.9.9/src/entrypoint.rs:120:9: 127:10
  ↪ }
2     fn entrypoint::process_instruction(){//
      ↪ token-swap/program/src/entrypoint.rs:10:1: 21:2 }
3         fn processor::Processor::process(){//
          ↪ token-swap/program/src/processor.rs:988:5: 990:6 }
4             fn processor::Processor::process_with_constraints(){//
              ↪ token-swap/program/src/processor.rs:993:5: 1069:6 }
```

```
5                   fn proces-
                    ↪  sor::Processor::process_deposit_single_token_type_exact_amount_i
                    ↪  token-swap/program/src/processor.rs:729:5: 846:6 }
6
```

- description:
- link:
- alleviation:

Issue: 2: MissingKeyCheck

Category	Severity	Status
MissingKeyCheck	Critical	UnResolved

- Location

token-swap/program/src/processor.rs:622:47: 622:70

```
622 swap_info.data.borrow()
623
```

- Code Context

Vulnerability at Line: 622

```
617         let dest_token_a_info = next_account_info(account_info_iter)?;
618         let dest_token_b_info = next_account_info(account_info_iter)?;
619         let pool_fee_account_info = next_account_info(account_info_iter)?;
620         let token_program_info = next_account_info(account_info_iter)?;
621
622         let token_swap = SwapVersion::unpack(&swap_info.data.borrow())?;
623         Self::check_accounts(
624             token_swap.as_ref(),
625             program_id,
626             swap_info,
627
```

- Call Stack

```
1 fn entrypoint::entrypoint(){// /home/yifei/.cargo/registry/src/github.com-
  ↪  1ecc6299db9ec823/solana-program-1.9.9/src/entrypoint.rs:120:9: 127:10
  ↪  }
2     fn entrypoint::process_instruction(){//
       ↪  token-swap/program/src/entrypoint.rs:10:1: 21:2 }
3         fn processor::Processor::process(){//
           ↪  token-swap/program/src/processor.rs:988:5: 990:6 }
4             fn processor::Processor::process_with_constraints(){//
               ↪  token-swap/program/src/processor.rs:993:5: 1069:6 }
```

```
5                   fn proces-
                    ↪  sor::Processor::process_withdraw_all_token_types(){//
                    ↪  token-swap/program/src/processor.rs:602:5: 726:6 }
6
```

- description:
- link:
- alleviation:

Issue: 3: MissingKeyCheck

Category	Severity	Status
MissingKeyCheck	Critical	UnResolved

- Location

token-swap/program/src/processor.rs:515:47: 515:70

```
515 swap_info.data.borrow()
516
```

- Code Context

Vulnerability at Line: 515

```
510         let token_b_info = next_account_info(account_info_iter)?;
511         let pool_mint_info = next_account_info(account_info_iter)?;
512         let dest_info = next_account_info(account_info_iter)?;
513         let token_program_info = next_account_info(account_info_iter)?;
514
515         let token_swap = SwapVersion::unpack(&swap_info.data.borrow())?;
516         let calculator = &token_swap.swap_curve().calculator;
517         if !calculator.allows_deposits() {
518             return Err(SwapError::UnsupportedCurveOperation.into());
519         }
520
```

- Call Stack

```
1 fn entrypoint::entrypoint(){// /home/yifei/.cargo/registry/src/github.com-
  ↪ 1ecc6299db9ec823/solana-program-1.9.9/src/entrypoint.rs:120:9: 127:10
  ↪ }
2     fn entrypoint::process_instruction(){//
      ↪ token-swap/program/src/entrypoint.rs:10:1: 21:2 }
3         fn processor::Processor::process(){//
          ↪ token-swap/program/src/processor.rs:988:5: 990:6 }
4             fn processor::Processor::process_with_constraints(){//
              ↪ token-swap/program/src/processor.rs:993:5: 1069:6 }
```

```
5                   fn proces-
                    ↪  sor::Processor::process_deposit_all_token_types(){//
                    ↪  token-swap/program/src/processor.rs:496:5: 599:6 }
6
```

- description:
- link:
- alleviation:

Issue: 4: MissingKeyCheck

Category	Severity	Status
MissingKeyCheck	Critical	UnResolved

- Location

token-swap/program/src/processor.rs:224:41: 224:64

```
224 swap_info.data.borrow()
225
```

- Code Context

Vulnerability at Line: 224

```
219         let fee_account_info = next_account_info(account_info_iter)?;
220         let destination_info = next_account_info(account_info_iter)?;
221         let token_program_info = next_account_info(account_info_iter)?;
222
223         let token_program_id = *token_program_info.key;
224         if SwapVersion::is_initialized(&swap_info.data.borrow()) {
225             return Err(SwapError::AlreadyInUse.into());
226         }
227
228         let (swap_authority, bump_seed) =
229
```

- Call Stack

```
1 fn entrypoint::entrypoint(){// /home/yifei/.cargo/registry/src/github.com-
  ↪ 1ecc6299db9ec823/solana-program-1.9.9/src/entrypoint.rs:120:9: 127:10
  ↪ }
2     fn entrypoint::process_instruction(){//
      ↪ token-swap/program/src/entrypoint.rs:10:1: 21:2 }
3         fn processor::Processor::process(){//
          ↪ token-swap/program/src/processor.rs:988:5: 990:6 }
4             fn processor::Processor::process_with_constraints(){//
              ↪ token-swap/program/src/processor.rs:993:5: 1069:6 }
```

```
5                    fn processor::Processor::process_initialize(){//
                     ↪  token-swap/program/src/processor.rs:206:5: 324:6 }
6
```

- description:
- link:
- alleviation:

Appendix

Copied from https://leaderboard.certik.io/projects/aave

Finding Categories

Gas Optimization

Gas Optimization findings do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

Mathematical Operations

Mathematical Operation findings relate to mishandling of math formulas, such as overflows, incorrect operations etc.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how block.timestamp works.

Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of private or delete.

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

Checksum Calculation Method

The “Checksum” field in the “Audit Scope” section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux “sha256sum” command against the target file.

Disclaimer

Copied from https://leaderboard.certik.io/projects/aave

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