Bitget orcaV1

SMART CONTRACT AUDIT REPORT

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ExVul

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Table of Contents

1. EXECUTIVE SUMMARY

Exvul Web3 Security was engaged by Bitget orcaV1 to review smart contract implementation. The assessment was conducted in accordance with our systematic approach to evaluate potential security issues based upon customer requirement. The report provides detailed recommendations to resolve the issue and provide additional suggestions or recommendations for improvement.

The outcome of the assessment outlined in chapter 3 provides the system's owners a full description of the vulnerabilities identified, the associated risk rating for each vulnerability, and detailed recommendations that will resolve the underlying technical issue.

1.1 Methodology

To standardize the evaluation, we define the following terminology based on OWASP Risk Rating Methodology [10] which is the gold standard in risk assessment using the following risk models:

- Likelihood: represents how likely a particular vulnerability is to be uncovered and exploited in the wild.
- Impact: measures the technical loss and business damage of a successful attack.
- Severity: determine the overall criticality of the risk.

Likelihood can be: High, Medium and Low and impact are categorized into for: High, Medium, Low, Informational. Severity is determined by likelihood and impact and can be classified into five categories accordingly, Critical, High, Medium, Low, Informational shown in table 1.1.

Likelihood \ IMPACT	Informational	Low	Medium	High
High	Informational	Medium	High	Critical
Medium	Informational	Low	Medium	High
Low	Informational	Low	Low	Medium

Table 1.1 Overall Risk Severity

To evaluate the risk, we will be going through a list of items, and each would be labelled with a severity category. The audit was performed with a systematic approach guided by a comprehensive assessment list carefully designed to identify known and impactful security issues. If our tool or analysis does not identify any issue, the contract can be considered safe regarding the assessed item. For any discovered issue, we might further deploy contracts on our private test environment

and run tests to confirm the findings. If necessary, we would additionally build a PoC to demonstrate the possibility of exploitation. The concrete list of check items is shown in Table 1.2.

- Basic Coding Bugs: We first statically analyze given smart contracts with our proprietary static code analyzer for known coding bugs, and then manually verify (reject or confirm) all the issues found by our tool.
- Code and business security testing: We further review business logics, examine system operations, and place DeFi-related aspects under scrutiny to uncover possible pitfalls and/or bugs.
- Additional Recommendations: We also provide additional suggestions regarding the coding and development of smart contracts from the perspective of proven programming practices.

Category	Assessment Item
Basic Coding Assessment	Apply Verification Control
	Authorization Access Control
	Forged Transfer Vulnerability
	Forged Transfer Notification
	Numeric Overflow
	Transaction Rollback Attack
	Transaction Block Stuffing Attack
	Soft Fail Attack
	Hard Fail Attack
	Abnormal Memo
	Abnormal Resource Consumption
	Secure Random Number
Advanced Source Code Scrutiny	Asset Security
	Cryptography Security
	Business Logic Review
	Source Code Functional Verification
	Account Authorization Control
	Sensitive Information Disclosure
	Circuit Breaker
	Blacklist Control
	System API Call Analysis
	Contract Deployment Consistency Check
Additional Recommendations	Semantic Consistency Checks

Category	Assessment Item
	Following Other Best Practices

Table 1.2: The Full List of Assessment Items

To better describe each issue we identified, we categorize the findings with Common Weakness Enumeration (CWE-699) [14], which is a community-developed list of software weakness types to better delineate and organize weaknesses around concepts frequently encountered in software development.

2. FINDINGS OVERVIEW

2.1 Project Info And Contract Address

Project Name: Bitget orcaV1

Audit Time: January 9, 2025 – January 21, 2025

Language: Rust

File Name	Link
orcaV1-clmm-router	https://github.com/bitgetwallet/solana-swap/commit/cd67b739f1c0fdcf22d610a16f46913c49c50335

2.2 Summary

Severity	Found	
Critical	0	
High	0	
Medium	0	
Low	1	
Informational	1	

2.3 Key Findings

ID	Severity	Findings Title	Status	Confirm
NVE-001	Low	amount_specified_is_input Fees collected may be paid by token_out	Ignore	Confirmed
NVE-002	Informational	Proxy_swap log output should be in the same format	Ignore	Confirmed

Table 2.3: Key Audit Findings

3. DETAILED DESCRIPTION OF FINDINGS

3.1 amount_specified_is_input Fees collected may be paid by token_out

ID:	NVE-001	Location:	proxy_swap.rs
Severity:	Low	Category:	Business Issues
Likelihood:	Low	Impact:	Low

Description:

This problem exists in both proxy_swap and proxy_swap_two_hop.

The handler_swap() method is used for exchange, and the amount_specified_is_input parameter is used to determine whether to charge fees from the input. However, when the a_to_b parameter entered by the user is false, the handling fee will be charged from the account of Token B. At this time, if the user does not have Token B, it will fail directly.

In addition, if the user has Token B, the subsequent execution of get_token_balances(&ctx, a_to_b) to obtain the balance will cause confusion in the obtained (token_in_after_balance, token_out_after_balance).

```
83
84  /*
85   * params amount: amount_specified_is_input ? token_in_amout, token_out_amout
86   * params other_amount_threshold: amount_specified_is_input ? token_out_min_amout, token_in_max_amout
87   * params sqrt_price_limit
88   * params amount_specified_is_input
89   * params a_to_b
90  */
91  pub fn handler_swap(
92    ctx: Context<ProxySwap>,
93    amount: u64,
94    other_amount_threshold: u64,
95    sqrt_price_limit: u128,
96    amount_specified_is_input: bool,
97    a_to_b: bool,
98  ) -> Result<()> {
99    require!(!ctx.accounts.admin_info.is_paused, ErrorCode::ProtocolPaused);
100   require!(other_amount_threshold > 0, ErrorCode::ThresholdAmountCannotBeZero);
101
102   let bkswapv2_program = ctx.accounts.bkswap_program.to_account_info();
103
104   let mut swap_amount = amount;
105   if amount_specified_is_input {
106       // exact_in: before collect_fee(token_in), after swap, check min_amount_out
107       swap_amount = collect_fee(&ctx, &bkswapv2_program, amount, a_to_b, true)?;
108       msg!("exact input: amount_in after fee: {}", swap_amount);
109   }
```

```
191  fn get_token_balances(ctx: &Context<ProxySwap>, a_to_b: bool) -> (u64, u64) {
192    if a_to_b {
193      (ctx.accounts.token_owner_account_a.amount, ctx.accounts.token_owner_account_b.amount)
194    } else {
195      (ctx.accounts.token_owner_account_b.amount, ctx.accounts.token_owner_account_a.amount)
196    }
197  }
```

Recommendations:

Add logic validation on a_to_b to ensure that the direction parameter is consistent with the direction of the user's redemption.

Result: Confirmed

Fix Result: Ignore

Customer response: If aToB is false, tokenOwnerAccountA and tokenOwnerAccountB will be exchanged. [tokenOwnerAccountA, tokenOwnerAccountB] = [tokenOwnerAccountB, tokenOwnerAccountA];.

3.2 Proxy_swap log output should be in the same format

ID:	NVE-002	Location:	proxy_swap.rs
Severity:	Informational	Category:	Business Issues
Likelihood:	Low	Impact:	Informational

Description:

Specify output and input logs, and consider keeping them consistent.

```
89  pub fn handler_swap(
90    ctx: Context<ProxySwap>,
91    amount: u64,
92    other_amount_threshold: u64,
93    sqrt_price_limit: u128,
94    amount_specified_is_input: bool,
95    a_to_b: bool,
96  ) -> Result<()> {
97    require!(!ctx.accounts.admin_info.is_paused, ErrorCode::ProtocolPaused);
98    require!(other_amount_threshold > 0, ErrorCode::ThresholdAmountCannotBeZero);
99
100   let bkswapv2_program = ctx.accounts.bkswap_program.to_account_info();
101
102   let mut swap_amount = amount;
103   if amount_specified_is_input {
104
105       swap_amount = collect_fee(&ctx, &bkswapv2_program, amount, a_to_b, true)?;
106       msg!("exact input: amount_in after fee: {}", swap_amount);
107   }
```

```
175   } else {
176     // exact_out: before swap, after collect_fee(token_out), check max_amount_in
177     let amount_out_after_fee = collect_fee(&ctx, &bkswapv2_program, swap_amount, a_to_b, false)?;
178     msg!("exact output amount after_out fee: {}", amount_out_after_fee);
179     require!(
180       token_in_before_balance.checked_sub(token_in_after_balance)
181           .ok_or(ErrorCode::ArithmeticError)? <= other_amount_threshold,
182       ErrorCode::TooMuchInputPaid
183     );
```

Recommendations:

Specifies that the output and input logs are consistent.

Result: Confirmed

Fix Result: Ignore

4. CONCLUSION

In this audit, we thoroughly analyzed Bitget orcaV1 smart contract implementation. The problems found are described and explained in detail in Section 3. The problems found in the audit have been communicated to the project leader. We therefore consider the audit result to be PASSED. To improve this report, we greatly appreciate any constructive feedbacks or suggestions, on our methodology, audit findings, or potential gaps in scope/coverage.

5. APPENDIX

5.1 Basic Coding Assessment

5.1.1 Apply Verification Control

- Description: The security of apply verification
- Result: Not found
- Severity: Critical

5.1.2 Authorization Access Control

- Description: Permission checks for external integral functions
- Result: Not found
- Severity: Critical

5.1.3 Forged Transfer Vulnerability

- Description: Assess whether there is a forged transfer notification vulnerability in the contract
- Result: Not found
- Severity: Critical

5.1.4 Transaction Rollback Attack

- Description: Assess whether there is transaction rollback attack vulnerability in the contract.
- Result: Not found
- Severity: Critical

5.1.5 Transaction Block Stuffing Attack

- Description: Assess whether there is transaction blocking attack vulnerability.
- Result: Not found
- Severity: Critical

5.1.6 Soft Fail Attack Assessment

- Description: Assess whether there is soft fail attack vulnerability.
- Result: Not found
- Severity: Critical

5.1.7 Hard Fail Attack Assessment

- Description: Examine for hard fail attack vulnerability
- Result: Not found
- Severity: Critical

5.1.8 Abnormal Memo Assessment

- Description: Assess whether there is abnormal memo vulnerability in the contract.
- Result: Not found
- Severity: Critical

5.1.9 Abnormal Resource Consumption

- Description: Examine whether abnormal resource consumption in contract processing.
- Result: Not found
- Severity: Critical

5.1.10 Random Number Security

- Description: Examine whether the code uses insecure random number.
- Result: Not found
- Severity: Critical

5.2 Advanced Code Scrutiny

5.2.1 Cryptography Security

- Description: Examine for weakness in cryptograph implementation.
- Results: Not Found
- Severity: High

5.2.2 Account Permission Control

- Description: Examine permission control issue in the contract
- Results: Not Found
- Severity: Medium

5.2.3 Malicious Code Behavior

- Description: Examine whether sensitive behavior present in the code
- Results: Not found
- Severity: Medium

5.2.4 Sensitive Information Disclosure

- Description: Examine whether sensitive information disclosure issue present in the code.
- Result: Not found
- Severity: Medium

5.2.5 System API

- Description: Examine whether system API application issue present in the code
- Results: Not found
- Severity: Low

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Blockchain technology and cryptographic assets present a high level of ongoing risk. ExVul's position is that each company and individual are responsible for their own due diligence and continuous security. ExVul's goal is to help reduce the attack vectors and the high level of variance associated with utilizing new and consistently changing technologies, and in no way claims any guarantee of security or functionality of the technology we agree to analyze.

7. REFERENCES

[1] MITRE. CWE- 191: Integer Underflow (Wrap or Wraparound).

https://cwe.mitre.org/data/ definitions/191.html.

[2] MITRE. CWE- 197: Numeric Truncation Error.

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[3] MITRE. CWE-400: Uncontrolled Resource Consumption.

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[4] MITRE. CWE-440: Expected Behavior Violation.

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[6] MITRE. CWE CATEGORY: 7PK - Security Features.

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[9] MITRE. CWE CATEGORY: Resource Management Errors.

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[10] OWASP. Risk Rating Methodology.

https://www.owasp.org/index.php/OWASP_Risk_Rating_Methodology

www.exvul.com

contact@exvul.com

@EXVULSEC

github.com/EXVUL-Sec

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