GUARDIAN

GMX

V2.1 Updates #3

Security Assessment

June 14th, 2024

Summary

Audit Firm Guardian

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Client Firm GMX

Final Report Date June 14th, 2024

Audit Summary

GMX engaged Guardian to review the security of updates to it's synthetic assets exchange. From the 10th of June to the 12th of June, a team of 2 auditors reviewed the source code in scope. All findings have been recorded in the following report.

For a detailed understanding of risk severity, source code vulnerability, and potential attack vectors, refer to the complete audit report below.

🔗 Blockchain network: **Arbitrum, Avalanche**

✅ Verify the authenticity of this report on Guardian's GitHub: https://github.com/guardianaudits

📊 Code coverage & PoC test suite: https://github.com/GuardianAudits/gmx-v2-1-fuzzing

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Project Information

Smart Contract Risk Assessment

Addendum

Project Overview

Project Summary

Project Name	GMX
Language	Solidity
Codebase	https://github.com/gmx-io/gmx-synthetics/
Commit(s)	Initial: c947be4571ec2d7d7cad05908a1f590808349f69 Final: add870b29899e99af5d3ba218aa797e3aa2543bd

Audit Summary

Delivery Date	June 14th, 2024
Audit Methodology	Static Analysis, Manual Review, Test Suite, Contract Fuzzing

Vulnerability Summary

Vulnerability Level	Total	Pending	Declined	Acknowledged	Partially Resolved	Resolved
● Critical	1	1	0	0	0	0
● High	0	0	0	0	0	0
● Medium	0	0	0	0	0	0
● Low	0	0	0	0	0	0

Audit Scope & Methodology

Vulnerability Classifications

Severity	Impact: *High*	Impact: *Medium*	Impact: *Low*
Likelihood: *High*	● Critical	● High	● Medium
Likelihood: *Medium*	● High	● Medium	● Low
Likelihood: *Low*	● Medium	● Low	● Low

Impact

High Significant loss of assets in the protocol, significant harm to a group of users, or a core functionality of the protocol is disrupted.

Medium A small amount of funds can be lost or ancillary functionality of the protocol is affected. The user or protocol may experience reduced or delayed receipt of intended funds.

Low Can lead to any unexpected behavior with some of the protocol's functionalities that is notable but does not meet the criteria for a higher severity.

Likelihood

High The attack is possible with reasonable assumptions that mimic on-chain conditions, and the cost of the attack is relatively low compared to the amount gained or the disruption to the protocol.

Medium An attack vector that is only possible in uncommon cases or requires a large amount of capital to exercise relative to the amount gained or the disruption to the protocol.

Low Unlikely to ever occur in production.

Audit Scope & Methodology

Methodology

Guardian is the ultimate standard for Smart Contract security. An engagement with Guardian entails the following:

- Two competing teams of Guardian security researchers performing an independent review.
- A dedicated fuzzing engineer to construct a comprehensive stateful fuzzing suite for the project.
- An engagement lead security researcher coordinating the 2 teams, performing their own analysis, relaying findings to the client, and orchestrating the testing/verification efforts.

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. Comprehensive written tests as a part of a code coverage testing suite.
- Contract fuzzing for increased attack resilience.

Findings & Resolutions

ID	Title	Category	Severity	Status
C-01	Risk Free Trades With cancellationReceiver	DoS	● Critical	Resolved

C-01 | Risk Free Trades With cancellationReceiver

Category	Severity	Location	Status
DoS	● Critical	OrderUtils.sol: 59, 187	Resolved

Description PoC

In the cancelOrder function if the order is an increase or swap order, which requires input funds, these funds are sent back to the cancellationReceiver.
When the cancellationReceiver address is the OrderVault the transferOut function will revert with the SelfTransferNotSupported error.

As a result a malicious actor may create a MarketIncrease order with the following properties:

- The cancellationReceiver is the OrderVault
- The swapPath includes a market that would fail it's reserves validation as a result of the swap

The order fails as the initial swap for the increase order cannot go through, but the order cannot be cancelled as the cancellationReceiver is the OrderVault.

Therefore the order will remain in the OrderStore until the malicious actor sees that price has moved in their favor relative to the range of prices that their MarketIncrease order may be executed with. The malicious actor can then deposit into the market in the swapPath which was previously failing the reserve validation, such that it no longer fails the reserve validation and the order can be executed. The malicious actor then realizes a risk-free profit.

If price should not move in the actor's favor during the 5 minute max price age period after their order's requestExpiration time, then the actor may update their order and attempt the risk free trade over the next period.

Recommendation

Upon order creation validate that the cancellationReceiver is not the address of the OrderVault.

Resolution

GMX Team: Resolved.

Disclaimer

This report is not, nor should be considered, an “endorsement” or “disapproval” of any particular project or team. This report is not, nor should be considered, an indication of the economics or value of any “product” or “asset” created by any team or project that contracts Guardian to perform a security assessment. This report does not provide any warranty or guarantee regarding the absolute bug-free nature of the technology analyzed, nor do they provide any indication of the technologies proprietors, business, business model or legal compliance.

This report should not be used in any way to make decisions around investment or involvement with any particular project. This report in no way provides investment advice, nor should be leveraged as investment advice of any sort. This report represents an extensive assessing process intending to help our customers increase the quality of their code while reducing the high level of risk presented by cryptographic tokens and blockchain technology.

Blockchain technology and cryptographic assets present a high level of ongoing risk. Guardian’s position is that each company and individual are responsible for their own due diligence and continuous security. Guardian’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.

The assessment services provided by Guardian is subject to dependencies and under continuing development. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. Cryptographic tokens are emergent technologies and carry with them high levels of technical risk and uncertainty. The assessment reports could include false positives, false negatives, and other unpredictable results. The services may access, and depend upon, multiple layers of third-parties.

Notice that smart contracts deployed on the blockchain are not resistant from internal/external exploit. Notice that active smart contract owner privileges constitute an elevated impact to any smart contract’s safety and security. Therefore, Guardian does not guarantee the explicit security of the audited smart contract, regardless of the verdict.

About Guardian Audits

Founded in 2022 by DeFi experts, Guardian Audits is a leading audit firm in the DeFi smart contract space. With every audit report, Guardian Audits upholds best-in-class security while achieving our mission to relentlessly secure DeFi.

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