



**SOLIDProof**  
*Bring trust into your projects*

**Blockchain Security | Smart Contract Audits | KYC**

MADE IN GERMANY

**vEmpire**

**Audit**

**Security Assessment**

**29. March, 2022**

**For**



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# Disclaimer

SolidProof.io reports are not, nor should be considered, an “endorsement” or “disapproval” of any particular project or team. These reports are not, nor should be considered, an indication of the economics or value of any “product” or “asset” created by any team. SolidProof.io do not cover testing or auditing the integration with external contract or services (such as Unicrypt, Uniswap, PancakeSwap etc’...)

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SolidProof.io Reports represent an extensive auditing 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. SolidProof’s position is that each company and individual are responsible for their own due diligence and continuous security. SolidProof in no way claims any guarantee of security or functionality of the technology we agree to analyze.

Version	Date	Description
1.0	26. March 2022	<ul style="list-style-type: none"><li>• Layout project</li><li>• Automated- /Manual-Security Testing</li><li>• Summary</li></ul>
1.1	29. March 2022	<ul style="list-style-type: none"><li>• Reaudit</li></ul>

## **Network**

Ethereum (ERC20)

## **Website**

<https://v-empire.io/>

## **Telegram**

<https://t.me/vempirediscussion>

## **Twitter**

<http://twitter.com/vempiredigital>

## **Medium**

<https://medium.com/@v-empire.digital>

## **Discord**

<https://discord.gg/Wk3aF3PNKM>

## **Youtube**

<https://youtube.com/c/vEmpireDDAO>

## Description

vEmpire DDAO is the world's largest Decentralized Metaverse Investment Organization. The official vEmpire protocol incorporates different strategies to incentivize Metaverse token staking to fund the battle against centralisation.

vEmpire is entirely focused on protecting decentralized technologies through virtual property and Metaversal asset acquisition.

## Project Engagement

During the 24th of March 2022, **vEmpire Team** engaged Solidproof.io to audit smart contracts that they created. The engagement was technical in nature and focused on identifying security flaws in the design and implementation of the contracts. They provided Solidproof.io with access to their code repository and whitepaper.

## Logo



## Contract Link

### v1.0

- Github
  - <https://github.com/v-Empire/vEmpire/blob/dc38c85e618fa7a93f1798d52aad9f8bdd9a6a70/smart-contract/contracts/staking/MasterChefAPE.sol>
  - Commit: dc38c85e618fa7a93f1798d52aad9f8bdd9a6a70

### v1.1

- Github
  - <https://github.com/v-Empire/vEmpire/commit/132b5addbfa3714fdc8c9c733793e676e3239ec8>

# Vulnerability & Risk Level

Risk represents the probability that a certain source-threat will exploit vulnerability, and the impact of that event on the organization or system. Risk Level is computed based on CVSS version 3.0.

Level	Value	Vulnerability	Risk (Required Action)
<b>Critical</b>	9 - 10	A vulnerability that can disrupt the contract functioning in a number of scenarios, or creates a risk that the contract may be broken.	Immediate action to reduce risk level.
<b>High</b>	7 – 8.9	A vulnerability that affects the desired outcome when using a contract, or provides the opportunity to use a contract in an unintended way.	Implementation of corrective actions as soon as possible.
<b>Medium</b>	4 – 6.9	A vulnerability that could affect the desired outcome of executing the contract in a specific scenario.	Implementation of corrective actions in a certain period.
<b>Low</b>	2 – 3.9	A vulnerability that does not have a significant impact on possible scenarios for the use of the contract and is probably subjective.	Implementation of certain corrective actions or accepting the risk.
<b>Informational</b>	0 – 1.9	A vulnerability that have informational character but is not effecting any of the code.	An observation that does not determine a level of risk

# Auditing Strategy and Techniques Applied

Throughout the review process, care was taken to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices. To do so, reviewed line-by-line by our team of expert pentesters and smart contract developers, documenting any issues as there were discovered.

## **Methodology**

The auditing process follows a routine series of steps:

1. Code review that includes the following:
  - i) Review of the specifications, sources, and instructions provided to SolidProof to make sure we understand the size, scope, and functionality of the smart contract.
  - ii) Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
  - iii) Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to SolidProof describe.
2. Testing and automated analysis that includes the following:
  - i) Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
  - ii) Symbolic execution, which is analysing a program to determine what inputs causes each part of a program to execute.
3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.
4. Specific, itemized, actionable recommendations to help you take steps to secure your smart contracts.

## Used Code from other Frameworks/Smart Contracts (direct imports)

Imported packages:

Dependency / Import Path	Count
@openzeppelin/contracts/GSN/Context.sol	1
@openzeppelin/contracts/math/SafeMath.sol	1
@openzeppelin/contracts/token/ERC20/IERC20.sol	1
@openzeppelin/contracts/token/ERC20/SafeERC20.sol	1
@openzeppelin/contracts/utils/Address.sol	1



## Tested Contract Files

This audit covered the following files listed below with a SHA-1 Hash.

*A file with a different Hash has been modified, intentionally or otherwise, after the security review. A different Hash could be (but not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of this review.*

### v1.0

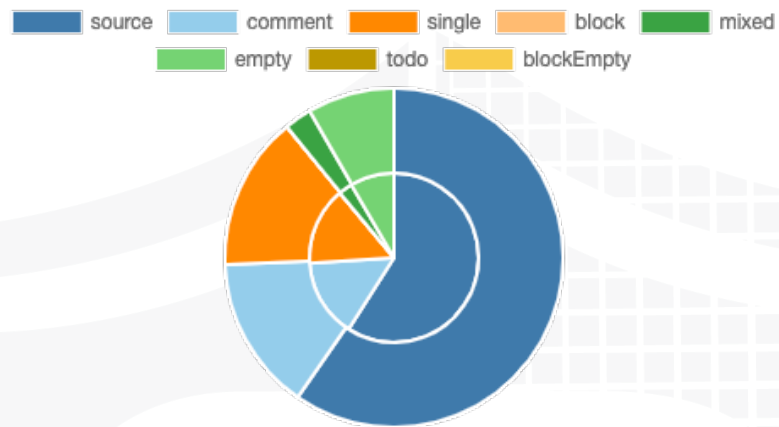
File Name	SHA-1 Hash
contracts/MasterChefAPE.sol	2886a68349c0e38a39569420aa36ff25a6bad002

### v1.1

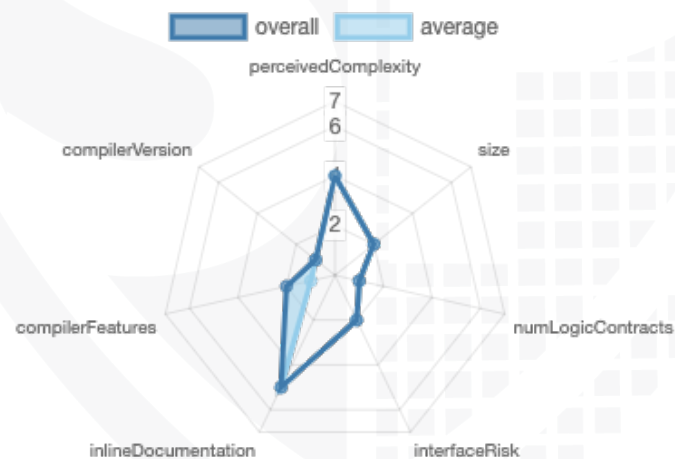
File Name	SHA-1 Hash
contracts/MasterChefAPE.sol	11fc5c9bfedbd9f041d3ba9a1215b7c965bd0734

# Metrics

## Source Lines v1.0



## Risk Level v1.0



## Capabilities

### Components

Version	Contracts	Libraries	Interfaces	Abstract
1.0	1	0	0	0

### Exposed Functions

*This section lists functions that are explicitly declared public or payable. Please note that getter methods for public stateVars are not included.*

Version	Public	Payable
1.0	17	0

Version	External	Internal	Private	Pure	View
1.0	2	18	0	1	2

### State Variables

Version	Total	Public
1.0	13	13

### Capabilities

Version	Solidity Versions observed	Experimental Features	Can Receive Funds	Uses Assembly	Has Destroyable Contracts
1.0	=0.6.12				

Version	Transfers ETH	Low-Level Calls	DelegateCall	Uses Hash Functions	EC Recover	New/Create/Create2
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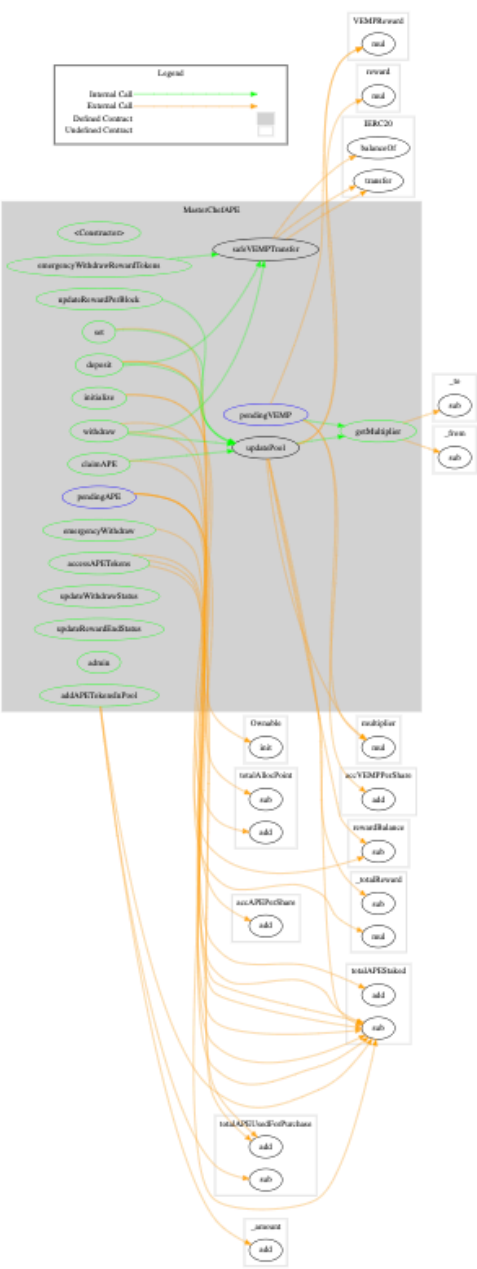
1.0	yes					
-----	-----	--	--	--	--	--

## Inheritance Graph v1.0



# CallGraph

v1.0



## Scope of Work/Verify Claims

The above token Team provided us with the files that needs to be tested (Github, Bscscan, Etherscan, files, etc.). The scope of the audit is the main contract (usual the same name as team appended with .sol).

We will verify the following claims:

1. Correct implementation of Token standard
2. Overall checkup (Smart Contract Security)



## Write functions of contract v1.0

1. accessAPETokens
2. addAPETokensInPool
3. admin
4. claimAPE
5. deposit
6. emergencyWithdraw
7. emergencyWithdrawRewardTokens
8. initialize
9. renounceOwnership
10. set
11. transferOwnership
12. updateRewardEndStatus
13. updateRewardPerBlock
14. updateWithdrawStatus
15. withdraw

## Overall checkup (Smart Contract Security)

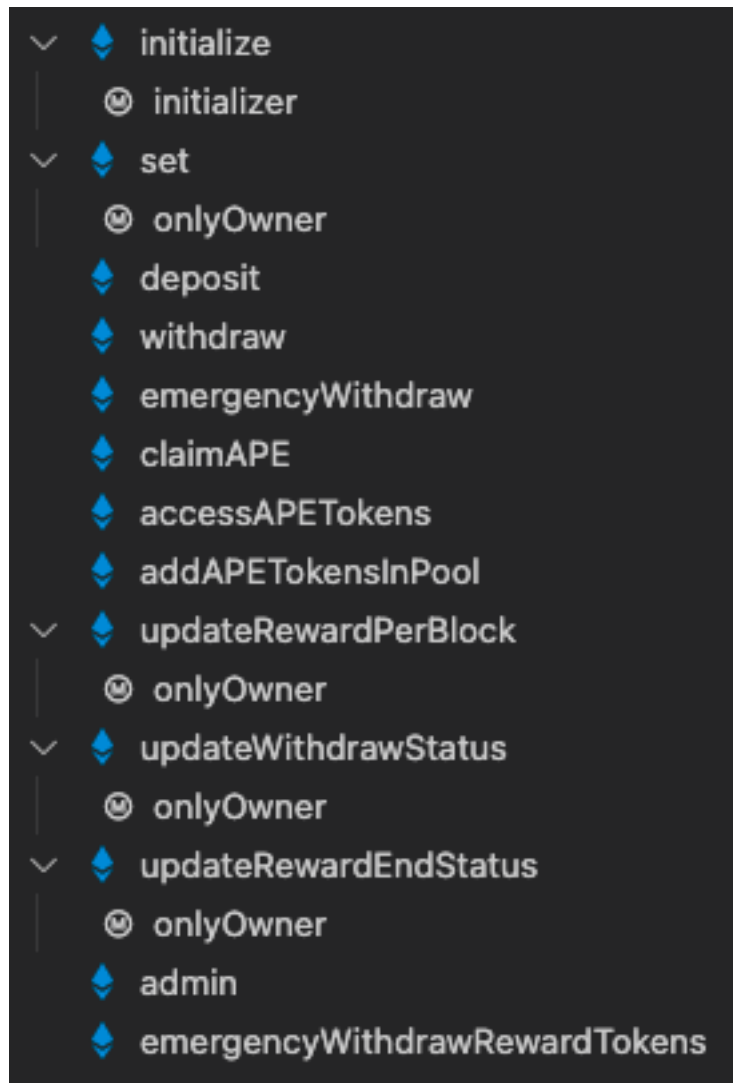
Tested	Verified
✓	✓

### Legend

Attribute	Symbol
Verified / Checked	✓
Partly Verified	⚠
Unverified / Not checked	✗
Not available	—



## Modifiers and public functions v1.0



Information: Not listed functions are directly imported functions from library (openzeppelin)

### Comments

- Deployer can set following state variables without any limitations
  - poolInfo.allocPoint
  - VEMPPerBlock
  - rewardEndBlock
- Deployer can enable/disable following state variables
  - withdrawStatus
  - rewardEndStatus = \_status;
- Only admin address can set following addresses/urls
  - adminaddr





- Only owner can lock following functions with withdrawStatus state variable
  - Withdraw
  - EmergencyWithdraw
- Only admin address can call emergencyWithdrawRewardToken

**Please check if an OnlyOwner or similar restrictive modifier has been forgotten.**







## Source Units in Scope

### v1.0

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/MasterChefAPE.sol	1	————	337	331	245	62	203	
	Totals	1	————	337	331	245	62	203	

### v1.1

Type	File	Logic Contracts	Interfaces	Lines	nLines	nSLOC	Comment Lines	Complex. Score	Capabilities
	contracts/MasterChefAPE.sol	7	1	1034	956	488	478	357	
	Totals	7	1	1034	956	488	478	357	

### Legend

Attribute	Description
Lines	total lines of the source unit
nLines	normalized lines of the source unit (e.g. normalizes functions spanning multiple lines)
nSLOC	normalized source lines of code (only source-code lines; no comments, no blank lines)
Comment Lines	lines containing single or block comments
Complexity Score	a custom complexity score derived from code statements that are known to introduce code complexity (branches, loops, calls, external interfaces, ...)

# Audit Results

**AUDIT PASSED**

## Critical issues

**No critical issues**

## High issues

**No high issues**

## Medium issues

**No medium issues**

## Low issues

**No low issues**

## Informational issues

**No informational issues**

## Test Protocol

### MasterChefAPE

#### set/update variables

- ✓ should set correct state variables
- ✓ should allow admin and only admin to update admin (65ms)
- ✓ should allow admin and only admin to update

#### updateRewardEndStatus (65ms)

- ✓ should allow admin and only admin to update

#### updateWithdrawStatus (53ms)

##### emergency withdraw reward tokens

- ✓ not allow non-admin to withdraw tokens
- ✓ allow only admin to withdraw tokens (39ms)

##### Only admin can stop to withdraw tokens

- ✓ allow withdraw staked tokens (74ms)
- ✓ not allow withdraw staked tokens (96ms)

##### With ERC/LP token added to the field

- ✓ should give out vemp only after farming time (64866ms)
- ✓ should not distribute vemp if no one deposit (630ms)
- ✓ should distribute vemp properly for each staker (911ms)
- ✓ Transfer Ownership (78ms)

##### Access APE Tokens by Admin

- ✓ Failed if any user(not admin) want to access APE tokens (548ms)
- ✓ Failed if any admin want to access APE tokens more then locked

#### amount (695ms)

- ✓ Update All variables on stake and access APE tokens (3792ms)

##### Re-Distribution of APE tokens to all stake holders in rewards

- ✓ Re-Distribute APE tokens by Admin (1140ms)

##### Claim APE Reward tokens

- ✓ Claim APE tokens by stakers (1455ms)

## Audit Comments

We recommend you to use the special form of comments (NatSpec Format, Follow link for more information <https://docs.soliditylang.org/en/v0.5.10/natspec-format.html>) for your contracts to provide rich documentation for functions, return variables and more. This helps investors to make clear what that variables, functions etc. do.

### 26. March 2022:

- Read whole report for more information

### 29. March 2022:

- Bugs were completely fixed by the vEmpire team
- Read whole report for more information

## SWC Attacks

ID	Title	Relationships	Status
<a href="#">SW C-1 36</a>	Unencrypted Private Data On-Chain	<a href="#">CWE-767: Access to Critical Private Variable via Public Method</a>	PASSED
<a href="#">SW C-1 35</a>	Code With No Effects	<a href="#">CWE-1164: Irrelevant Code</a>	PASSED
<a href="#">SW C-1 34</a>	Message call with hardcoded gas amount	<a href="#">CWE-655: Improper Initialization</a>	PASSED
<a href="#">SW C-1 33</a>	Hash Collisions With Multiple Variable Length Arguments	<a href="#">CWE-294: Authentication Bypass by Capture-replay</a>	PASSED
<a href="#">SW C-1 32</a>	Unexpected Ether balance	<a href="#">CWE-667: Improper Locking</a>	PASSED
<a href="#">SW C-1 31</a>	Presence of unused variables	<a href="#">CWE-1164: Irrelevant Code</a>	PASSED
<a href="#">SW C-1 30</a>	Right-To-Left-Override control character (U+202E)	<a href="#">CWE-451: User Interface (UI) Misrepresentation of Critical Information</a>	PASSED
<a href="#">SW C-1 29</a>	Typographical Error	<a href="#">CWE-480: Use of Incorrect Operator</a>	PASSED
<a href="#">SW C-1 28</a>	DoS With Block Gas Limit	<a href="#">CWE-400: Uncontrolled Resource Consumption</a>	PASSED

<a href="#">SW C-1 27</a>	Arbitrary Jump with Function Type Variable	<a href="#">CWE-695: Use of Low-Level Functionality</a>	<b>PASSED</b>
<a href="#">SW C-1 25</a>	Incorrect Inheritance Order	<a href="#">CWE-696: Incorrect Behavior Order</a>	<b>PASSED</b>
<a href="#">SW C-1 24</a>	Write to Arbitrary Storage Location	<a href="#">CWE-123: Write-what-where Condition</a>	<b>PASSED</b>
<a href="#">SW C-1 23</a>	Requirement Violation	<a href="#">CWE-573: Improper Following of Specification by Caller</a>	<b>PASSED</b>
<a href="#">SW C-1 22</a>	Lack of Proper Signature Verification	<a href="#">CWE-345: Insufficient Verification of Data Authenticity</a>	<b>PASSED</b>
<a href="#">SW C-1 21</a>	Missing Protection against Signature Replay Attacks	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>
<a href="#">SW C-1 20</a>	Weak Sources of Randomness from Chain Attributes	<a href="#">CWE-330: Use of Insufficiently Random Values</a>	<b>PASSED</b>
<a href="#">SW C-11 9</a>	Shadowing State Variables	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-11 8</a>	Incorrect Constructor Name	<a href="#">CWE-665: Improper Initialization</a>	<b>PASSED</b>
<a href="#">SW C-11 7</a>	Signature Malleability	<a href="#">CWE-347: Improper Verification of Cryptographic Signature</a>	<b>PASSED</b>



<a href="#">SW C-11 6</a>	Timestamp Dependence	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 5</a>	Authorization through tx.origin	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 4</a>	Transaction Order Dependence	<a href="#">CWE-362: Concurrent Execution using Shared Resource with Improper Synchronization ('Race Condition')</a>	<b>PASSED</b>
<a href="#">SW C-11 3</a>	DoS with Failed Call	<a href="#">CWE-703: Improper Check or Handling of Exceptional Conditions</a>	<b>PASSED</b>
<a href="#">SW C-11 2</a>	Delegatecall to Untrusted Callee	<a href="#">CWE-829: Inclusion of Functionality from Untrusted Control Sphere</a>	<b>PASSED</b>
<a href="#">SW C-11 1</a>	Use of Deprecated Solidity Functions	<a href="#">CWE-477: Use of Obsolete Function</a>	<b>PASSED</b>
<a href="#">SW C-11 0</a>	Assert Violation	<a href="#">CWE-670: Always-Incorrect Control Flow Implementation</a>	<b>PASSED</b>
<a href="#">SW C-1 09</a>	Uninitialized Storage Pointer	<a href="#">CWE-824: Access of Uninitialized Pointer</a>	<b>PASSED</b>
<a href="#">SW C-1 08</a>	State Variable Default Visibility	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>
<a href="#">SW C-1 07</a>	Reentrancy	<a href="#">CWE-841: Improper Enforcement of Behavioral Workflow</a>	<b>PASSED</b>
<a href="#">SW C-1 06</a>	Unprotected SELFDESTRUCT Instruction	<a href="#">CWE-284: Improper Access Control</a>	<b>PASSED</b>

<a href="#">SW</a> <a href="#">C-1</a> <a href="#">05</a>	Unprotected Ether Withdrawal	<a href="#">CWE-284: Improper Access Control</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">04</a>	Unchecked Call Return Value	<a href="#">CWE-252: Unchecked Return Value</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">03</a>	Floating Pragma	<a href="#">CWE-664: Improper Control of a Resource Through its Lifetime</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">02</a>	Outdated Compiler Version	<a href="#">CWE-937: Using Components with Known Vulnerabilities</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">01</a>	Integer Overflow and Underflow	<a href="#">CWE-682: Incorrect Calculation</a>	<b>PASSED</b>
<a href="#">SW</a> <a href="#">C-1</a> <a href="#">00</a>	Function Default Visibility	<a href="#">CWE-710: Improper Adherence to Coding Standards</a>	<b>PASSED</b>

The logo features the words "SolidProofed" in a white, elegant script font. The word "Solid" is positioned above "Proofed". Behind the text is a faint, stylized shield emblem with a grid-like pattern. The entire design is set against a solid blue background.

SolidProofed

**Blockchain Security | Smart Contract Audits | KYC**

A small horizontal bar representing the German flag, with black, red, and gold stripes.

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