



Kodexa

# Smart Contract Audit Report

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# AUDITED DETAILS

## Audited Project

Project name	Token ticker	Blockchain
Kodexa	Kodexa	Binance Smart Chain

## Addresses

Contract address	0xb007549db2a335364dfdce86001ee3b081051f03
Contract deployer address	0xC5a80c2F0BEe434362cdf3b97a19726DC7A98424

## Project Website

<https://mosaicalpha.com/>

## Codebase

<https://bscscan.com/address/0xb007549db2a335364dfdce86001ee3b081051f03#code>

# SUMMARY

DeFi Solutions With Science and Fantasy We have designed our decentralized financial solutions to be as comfortable to use as standard banking solutions are. With our easy-to-use platform and managed token basket features, we are eager to open the world of crypto to everyone. To contribute to the increase of financial awareness around the world, we are publishing educational content about the crypto world for every user level. We have created a whole new level of asset management for professional crypto traders.

## Contract Summary

### Documentation Quality

Kodexa provides a very good documentation with standard of solidity base code.

- The technical description is provided clearly and structured and also don't have any high risk issue.

### Code Quality

The Overall quality of the basecode is standard.

- Standard solidity basecode and rules are already followed by Kodexa with the discovery of several low issues.

### Test Coverage

Test coverage of the project is 100% ( Through Codebase )

## Audit Findings Summary

- SWC-100 SWC-108 | Explicitly define visibility for all state variables on lines 937.
- SWC-101 | It is recommended to use vetted safe math libraries for arithmetic operations consistently on lines 567, 586, 608, 641, 643, 664, 665, 690, 692, 797, 865, 889, 1052, 1090, 1129, 1131, 1156, 1158, 1275, 1303, 1304, 1090, 1131, 1158, 1303 and 1304.
- SWC-103 | Pragma statements can be allowed to float when a contract is intended on lines 8.
- SWC-110 SWC-123 | It is recommended to use of revert(), assert(), and require() in Solidity, and the new REVERT opcode in the EVM on lines 935, 936, 1201, 1202, 866, 866, 890, 1053, 1130, 1131, 1131, 1157, 1158, 1158, 1276, 1277, 1277, 1278, 1303, 1303, 1304 and 1304.

# CONCLUSION

We have audited the Kodexa project released on January 2023 to discover issues and identify potential security vulnerabilities in Kodexa Project. This process is used to find technical issues and security loopholes which might be found in the smart contract.

The security audit report provides satisfactory results with low-risk issues.

The Kodexa smart contract code issues do not pose a considerable risk. The writing of the contract is close to the standard of writing contracts in general. The low-risk issues are that a floating pragma is set, state variable visibility is not set, public state variable with array type causing reachable exception by default, and out-of-bounds array access. The current pragma Solidity directive is `^0.8.0`. Specifying a fixed compiler version is recommended to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code. State variable visibility is not set, the best practice is to set the visibility of state variables explicitly. The default visibility for `rolesMap` is internal. Other possible visibility settings are public and private.

# AUDIT RESULT

Article	Category	Description	Result
Default Visibility	SWC-100 SWC-108	Functions and state variables visibility should be set explicitly. Visibility levels should be specified consciously.	ISSUE FOUND
Integer Overflow and Underflow	SWC-101	If unchecked math is used, all math operations should be safe from overflows and underflows.	ISSUE FOUND
Outdated Compiler Version	SWC-102	It is recommended to use a recent version of the Solidity compiler.	PASS
Floating Pragma	SWC-103	Contracts should be deployed with the same compiler version and flags that they have been tested thoroughly.	ISSUE FOUND
Unchecked Call Return Value	SWC-104	The return value of a message call should be checked.	PASS
Unprotected Ether Withdrawal	SWC-105	Due to missing or insufficient access controls, malicious parties can withdraw from the contract.	PASS
SELFDESTRUCT Instruction	SWC-106	The contract should not be self-destructible while it has funds belonging to users.	PASS
Reentrancy	SWC-107	Check effect interaction pattern should be followed if the code performs recursive call.	PASS
Uninitialized Storage Pointer	SWC-109	Uninitialized local storage variables can point to unexpected storage locations in the contract.	PASS
Assert Violation	SWC-110 SWC-123	Properly functioning code should never reach a failing assert statement.	ISSUE FOUND
Deprecated Solidity Functions	SWC-111	Deprecated built-in functions should never be used.	PASS
Delegate call to Untrusted Callee	SWC-112	Delegatecalls should only be allowed to trusted addresses.	PASS

DoS (Denial of Service)	SWC-113 SWC-128	Execution of the code should never be blocked by a specific contract state unless required.	PASS
Race Conditions	SWC-114	Race Conditions and Transactions Order Dependency should not be possible.	PASS
Authorization through tx.origin	SWC-115	tx.origin should not be used for authorization.	PASS
Block values as a proxy for time	SWC-116	Block numbers should not be used for time calculations.	PASS
Signature Unique ID	SWC-117 SWC-121 SWC-122	Signed messages should always have a unique id. A transaction hash should not be used as a unique id.	PASS
Incorrect Constructor Name	SWC-118	Constructors are special functions that are called only once during the contract creation.	PASS
Shadowing State Variable	SWC-119	State variables should not be shadowed.	PASS
Weak Sources of Randomness	SWC-120	Random values should never be generated from Chain Attributes or be predictable.	PASS
Write to Arbitrary Storage Location	SWC-124	The contract is responsible for ensuring that only authorized user or contract accounts may write to sensitive storage locations.	PASS
Incorrect Inheritance Order	SWC-125	When inheriting multiple contracts, especially if they have identical functions, a developer should carefully specify inheritance in the correct order. The rule of thumb is to inherit contracts from more /general/ to more /specific/.	PASS
Insufficient Gas Griefing	SWC-126	Insufficient gas grieving attacks can be performed on contracts which accept data and use it in a sub-call on another contract.	PASS
Arbitrary Jump Function	SWC-127	As Solidity doesnt support pointer arithmetics, it is impossible to change such variable to an arbitrary value.	PASS

Typographical Error	SWC-129	A typographical error can occur for example when the intent of a defined operation is to sum a number to a variable.	PASS
Override control character	SWC-130	Malicious actors can use the Right-To-Left-Override unicode character to force RTL text rendering and confuse users as to the real intent of a contract.	PASS
Unused variables	SWC-131 SWC-135	Unused variables are allowed in Solidity and they do not pose a direct security issue.	PASS
Unexpected Ether balance	SWC-132	Contracts can behave erroneously when they strictly assume a specific Ether balance.	PASS
Hash Collisions Variable	SWC-133	Using abi.encodePacked() with multiple variable length arguments can, in certain situations, lead to a hash collision.	PASS
Hardcoded gas amount	SWC-134	The transfer() and send() functions forward a fixed amount of 2300 gas.	PASS
Unencrypted Private Data	SWC-136	It is a common misconception that private type variables cannot be read.	PASS



# SMART CONTRACT ANALYSIS

Started	Saturday Dec 18 2021 03:12:25 GMT+0000 (Coordinated Universal Time)
Finished	Sunday Dec 19 2021 05:29:48 GMT+0000 (Coordinated Universal Time)
Mode	Standard
Main Source File	KodexaToken.sol

## Detected Issues

ID	Title	Severity	Status
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "+" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "+=" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "+=" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "+=" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "+=" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-=" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "++" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "++" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "++" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged

SWC-101	ARITHMETIC OPERATION "++" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "++" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "++" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	ARITHMETIC OPERATION "-" DISCOVERED	low	acknowledged
SWC-101	COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED	low	acknowledged
SWC-101	COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED	low	acknowledged
SWC-101	COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED	low	acknowledged
SWC-101	COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED	low	acknowledged
SWC-101	COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-108	STATE VARIABLE VISIBILITY IS NOT SET.	low	acknowledged
SWC-110	PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.	low	acknowledged
SWC-110	PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.	low	acknowledged
SWC-110	PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.	low	acknowledged
SWC-110	PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.	low	acknowledged



# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 567

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
566     unchecked {  
567         _approve(sender, _msgSender(), currentAllowance - amount);  
568     }  
569  
570     return true;  
571
```

# SWC-101 | ARITHMETIC OPERATION "+" DISCOVERED

LINE 586

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
585     function increaseAllowance(address spender, uint256 addedValue) public virtual
returns (bool) {
586     _approve(_msgSender(), spender, _allowances[_msgSender()][spender] + addedValue);
587     return true;
588 }
589
590
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 608

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
607     unchecked {  
608         _approve(_msgSender(), spender, currentAllowance - subtractedValue);  
609     }  
610  
611     return true;  
612
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 641

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
640     unchecked {  
641         _balances[sender] = senderBalance - amount;  
642     }  
643     _balances[recipient] += amount;  
644  
645
```

# SWC-101 | ARITHMETIC OPERATION "+=" DISCOVERED

LINE 643

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
642     }  
643     _balances[recipient] += amount;  
644  
645     emit Transfer(sender, recipient, amount);  
646  
647
```



# SWC-101 | ARITHMETIC OPERATION "+=" DISCOVERED

LINE 664

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
663
664   _totalSupply += amount;
665   _balances[account] += amount;
666   emit Transfer(address(0), account, amount);
667
668
```

# SWC-101 | ARITHMETIC OPERATION "+=" DISCOVERED

LINE 665

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
664  _totalSupply += amount;  
665  _balances[account] += amount;  
666  emit Transfer(address(0), account, amount);  
667  
668  _afterTokenTransfer(address(0), account, amount);  
669
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 690

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
689     unchecked {  
690         _balances[account] = accountBalance - amount;  
691     }  
692     _totalSupply -= amount;  
693  
694
```

# SWC-101 | ARITHMETIC OPERATION "-=" DISCOVERED

LINE 692

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
691     }  
692     _totalSupply -= amount;  
693  
694     emit Transfer(account, address(0), amount);  
695  
696
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 797

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
796     unchecked {  
797         _approve(account, _msgSender(), currentAllowance - amount);  
798     }  
799     _burn(account, amount);  
800 }  
801
```

# SWC-101 | ARITHMETIC OPERATION "++" DISCOVERED

LINE 865

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
864 // query support of each interface in interfaceIds
865 for (uint256 i = 0; i < interfaceIds.length; i++) {
866     interfaceIdsSupported[i] = _supportsERC165Interface(account, interfaceIds[i]);
867 }
868 }
869
```

# SWC-101 | ARITHMETIC OPERATION "++" DISCOVERED

LINE 889

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
888 // query support of each interface in _interfaceIds
889 for (uint256 i = 0; i < interfaceIds.length; i++) {
890     if (!_supportsERC165Interface(account, interfaceIds[i])) {
891         return false;
892     }
893 }
```

# SWC-101 | ARITHMETIC OPERATION "++" DISCOVERED

LINE 1052

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1051     extRegistry = _extreg;  
1052     for (uint i=0; i < _ownrs.length; i++)  
1053         _addOwner(_ownrs[i]);  
1054     }  
1055  
1056
```



# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 1090

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1089  uint256 intmax;  
1090  unchecked { intmax = uint256(0) - 1;}  
1091  uint256 tmp = rolesMap[_address] & (intmax ^ (uint256(1) << _role));  
1092  
1093  if (tmp == 0) {  
1094
```

# SWC-101 | ARITHMETIC OPERATION "++" DISCOVERED

LINE 1129

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1128  _unsetRole(_ownr, Roles.OWNER);
1129  for (uint i=0; i < owners.length; i++){
1130    if (owners[i] == _ownr) {
1131      owners[i] = owners[owners.length-1];
1132      owners.pop();
1133    }
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 1131

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1130  if (owners[i] == _ownr) {  
1131  owners[i] = owners[owners.length-1];  
1132  owners.pop();  
1133  break;  
1134  }  
1135
```

# SWC-101 | ARITHMETIC OPERATION "++" DISCOVERED

LINE 1156

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1155  _unsetRole(_mgr, Roles.MANAGER);
1156  for (uint i=0; i < managers.length; i++){
1157    if (managers[i] == _mgr) {
1158      managers[i] = managers[managers.length-1];
1159      managers.pop();
1160
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 1158

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1157     if (managers[i] == _mgr) {  
1158         managers[i] = managers[managers.length-1];  
1159         managers.pop();  
1160         break;  
1161     }  
1162
```

# SWC-101 | ARITHMETIC OPERATION "++" DISCOVERED

LINE 1275

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1274     if (contractWhitelist[_address]) return true;
1275     for (uint256 i = 0; i < secondaryWhitelistAddresses.length; i++) {
1276         if (secondaryWhitelistAddresses[i] != address(0)) {
1277             (bool success, bytes memory data) =
secondaryWhitelistAddresses[i].staticcall(abi.encodeWithSignature(secondaryWhitelistCallsS
trings[i], _address));
1278             if (success == true && data[31] > 0) return true;
1279         }
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 1303

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1302     require(_idx < secondaryWhitelistAddresses.length);
1303     secondaryWhitelistAddresses[_idx] =
secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];
1304     secondaryWhitelistCallStrings[_idx] =
secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];
1305     secondaryWhitelistAddresses.pop();
1306     secondaryWhitelistCallStrings.pop();
1307
```

# SWC-101 | ARITHMETIC OPERATION "-" DISCOVERED

LINE 1304

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1303     secondaryWhitelistAddresses[_idx] =  
secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];  
1304     secondaryWhitelistCallStrings[_idx] =  
secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];  
1305     secondaryWhitelistAddresses.pop();  
1306     secondaryWhitelistCallStrings.pop();  
1307 }  
1308
```



# SWC-101 | COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED

LINE 1090

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1089     uint256 intmax;  
1090     unchecked { intmax = uint256(0) - 1;}  
1091     uint256 tmp = rolesMap[_address] & (intmax ^ (uint256(1) << _role));  
1092  
1093     if (tmp == 0) {  
1094
```

# SWC-101 | COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED

LINE 1131

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1130     if (owners[i] == _ownr) {  
1131         owners[i] = owners[owners.length-1];  
1132         owners.pop();  
1133         break;  
1134     }  
1135
```

# SWC-101 | COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED

LINE 1158

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1157     if (managers[i] == _mgr) {  
1158         managers[i] = managers[managers.length-1];  
1159         managers.pop();  
1160         break;  
1161     }  
1162
```

# SWC-101 | COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED

LINE 1303

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1302     require(_idx < secondaryWhitelistAddresses.length);
1303     secondaryWhitelistAddresses[_idx] =
secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];
1304     secondaryWhitelistCallStrings[_idx] =
secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];
1305     secondaryWhitelistAddresses.pop();
1306     secondaryWhitelistCallStrings.pop();
1307
```

# SWC-101 | COMPILER-REWRITABLE "<UINT> - 1" DISCOVERED

LINE 1304

## low SEVERITY

This plugin produces issues to support false positive discovery within mythril.

## Source File

- KodexaToken.sol

## Locations

```
1303     secondaryWhitelistAddresses[_idx] =  
secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];  
1304     secondaryWhitelistCallStrings[_idx] =  
secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];  
1305     secondaryWhitelistAddresses.pop();  
1306     secondaryWhitelistCallStrings.pop();  
1307 }  
1308
```

## SWC-103 | A FLOATING PRAGMA IS SET.

LINE 8

### low SEVERITY

The current pragma Solidity directive is `""^0.8.0""`. It is recommended to specify a fixed compiler version to ensure that the bytecode produced does not vary between builds. This is especially important if you rely on bytecode-level verification of the code.

### Source File

- KodexaToken.sol

### Locations

```
7
8  pragma solidity ^0.8.0;
9
10 /**
11  * @dev Provides information about the current execution context, including the
12
```

## SWC-108 | STATE VARIABLE VISIBILITY IS NOT SET.

LINE 937

### low SEVERITY

It is best practice to set the visibility of state variables explicitly. The default visibility for "rolesMap" is internal. Other possible visibility settings are public and private.

### Source File

- KodexaToken.sol

### Locations

```
936 address[] public owners;  
937 mapping(address => uint256) rolesMap;  
938 address public extRegistry;  
939  
940 function hasRole(address _address, uint8 _role) external view returns (bool) {  
941
```

## SWC-110 | PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.

LINE 935

### low SEVERITY

The public state variable "managers" in "OwnableManageableChainableRoles" contract has type "address[]" and can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
934 contract OwnableManageableChainableRoles is IExternalOwnerManagerRegistry {  
935     address[] public managers;  
936     address[] public owners;  
937     mapping(address => uint256) rolesMap;  
938     address public extRegistry;  
939 }
```



## SWC-110 | PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.

LINE 936

### low SEVERITY

The public state variable "owners" in "OwnableManageableChainableRoles" contract has type "address[]" and can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
935 address[] public managers;  
936 address[] public owners;  
937 mapping(address => uint256) rolesMap;  
938 address public extRegistry;  
939  
940
```

## SWC-110 | PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.

LINE 1201

### low SEVERITY

The public state variable "secondaryWhitelistAddresses" in "KodexaToken" contract has type "address[]" and can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1200     bool private _locked;  
1201     address[] public secondaryWhitelistAddresses;  
1202     string[] public secondaryWhitelistCallStrings;  
1203  
1204     constructor(  
1205
```

## SWC-110 | PUBLIC STATE VARIABLE WITH ARRAY TYPE CAUSING REACHABLE EXCEPTION BY DEFAULT.

LINE 1202

### low SEVERITY

The public state variable "secondaryWhitelistCallStrings" in "KodexaToken" contract has type "string[]" and can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1201 address[] public secondaryWhitelistAddresses;
1202 string[] public secondaryWhitelistCallStrings;
1203
1204 constructor(
1205     string memory name,
1206
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 866

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
865     for (uint256 i = 0; i < interfaceIds.length; i++) {  
866         interfaceIdsSupported[i] = _supportsERC165Interface(account, interfaceIds[i]);  
867     }  
868 }  
869  
870
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 866

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
865     for (uint256 i = 0; i < interfaceIds.length; i++) {  
866         interfaceIdsSupported[i] = _supportsERC165Interface(account, interfaceIds[i]);  
867     }  
868 }  
869  
870
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 890

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
889   for (uint256 i = 0; i < interfaceIds.length; i++) {  
890     if (!_supportsERC165Interface(account, interfaceIds[i])) {  
891       return false;  
892     }  
893   }  
894
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1053

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1052   for (uint i=0; i < _ownrs.length; i++)
1053     _addOwner(_ownrs[i]);
1054   }
1055
1056   event ExternalRegistryAddressChanged(address addr);
1057
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1130

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1129   for (uint i=0; i < owners.length; i++){  
1130     if (owners[i] == _ownr) {  
1131       owners[i] = owners[owners.length-1];  
1132       owners.pop();  
1133       break;  
1134     }
```



## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1131

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1130   if (owners[i] == _ownr) {  
1131     owners[i] = owners[owners.length-1];  
1132     owners.pop();  
1133     break;  
1134   }  
1135
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1131

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1130   if (owners[i] == _ownr) {  
1131     owners[i] = owners[owners.length-1];  
1132     owners.pop();  
1133     break;  
1134   }  
1135
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1157

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1156   for (uint i=0; i < managers.length; i++){  
1157     if (managers[i] == _mgr) {  
1158       managers[i] = managers[managers.length-1];  
1159       managers.pop();  
1160       break;  
1161     }
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1158

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1157     if (managers[i] == _mgr) {  
1158         managers[i] = managers[managers.length-1];  
1159         managers.pop();  
1160         break;  
1161     }  
1162
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1158

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1157     if (managers[i] == _mgr) {  
1158         managers[i] = managers[managers.length-1];  
1159         managers.pop();  
1160         break;  
1161     }  
1162
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1276

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1275   for (uint256 i = 0; i < secondaryWhitelistAddresses.length; i++) {  
1276     if (secondaryWhitelistAddresses[i] != address(0)) {  
1277       (bool success, bytes memory data) =  
secondaryWhitelistAddresses[i].staticcall(abi.encodeWithSignature(secondaryWhitelistCalls  
trings[i], _address));  
1278       if (success == true && data[31] > 0) return true;  
1279     }  
1280
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1277

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1276     if (secondaryWhitelistAddresses[i] != address(0)) {  
1277         (bool success, bytes memory data) =  
secondaryWhitelistAddresses[i].staticcall(abi.encodeWithSignature(secondaryWhitelistCalls  
trings[i], _address));  
1278         if (success == true && data[31] > 0) return true;  
1279     }  
1280 }  
1281
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1277

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1276     if (secondaryWhitelistAddresses[i] != address(0)) {  
1277         (bool success, bytes memory data) =  
secondaryWhitelistAddresses[i].staticcall(abi.encodeWithSignature(secondaryWhitelistCalls  
trings[i], _address));  
1278         if (success == true && data[31] > 0) return true;  
1279     }  
1280 }  
1281
```



## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1278

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1277     (bool success, bytes memory data) =  
secondaryWhitelistAddresses[i].staticcall(abi.encodeWithSignature(secondaryWhitelistCalls  
trings[i], _address));  
1278     if (success == true && data[31] > 0) return true;  
1279     }  
1280     }  
1281     return false;  
1282
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1303

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1302     require(_idx < secondaryWhitelistAddresses.length);
1303     secondaryWhitelistAddresses[_idx] =
secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];
1304     secondaryWhitelistCallStrings[_idx] =
secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];
1305     secondaryWhitelistAddresses.pop();
1306     secondaryWhitelistCallStrings.pop();
1307
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1303

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1302     require(_idx < secondaryWhitelistAddresses.length);
1303     secondaryWhitelistAddresses[_idx] =
secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];
1304     secondaryWhitelistCallStrings[_idx] =
secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];
1305     secondaryWhitelistAddresses.pop();
1306     secondaryWhitelistCallStrings.pop();
1307
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1304

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1303     secondaryWhitelistAddresses[_idx] =  
        secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];  
1304     secondaryWhitelistCallStrings[_idx] =  
        secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];  
1305     secondaryWhitelistAddresses.pop();  
1306     secondaryWhitelistCallStrings.pop();  
1307 }  
1308
```

## SWC-110 | OUT OF BOUNDS ARRAY ACCESS

LINE 1304

### low SEVERITY

The index access expression can cause an exception in case of use of invalid array index value.

### Source File

- KodexaToken.sol

### Locations

```
1303     secondaryWhitelistAddresses[_idx] =  
        secondaryWhitelistAddresses[secondaryWhitelistAddresses.length - 1];  
1304     secondaryWhitelistCallStrings[_idx] =  
        secondaryWhitelistCallStrings[secondaryWhitelistCallStrings.length - 1];  
1305     secondaryWhitelistAddresses.pop();  
1306     secondaryWhitelistCallStrings.pop();  
1307 }  
1308
```

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