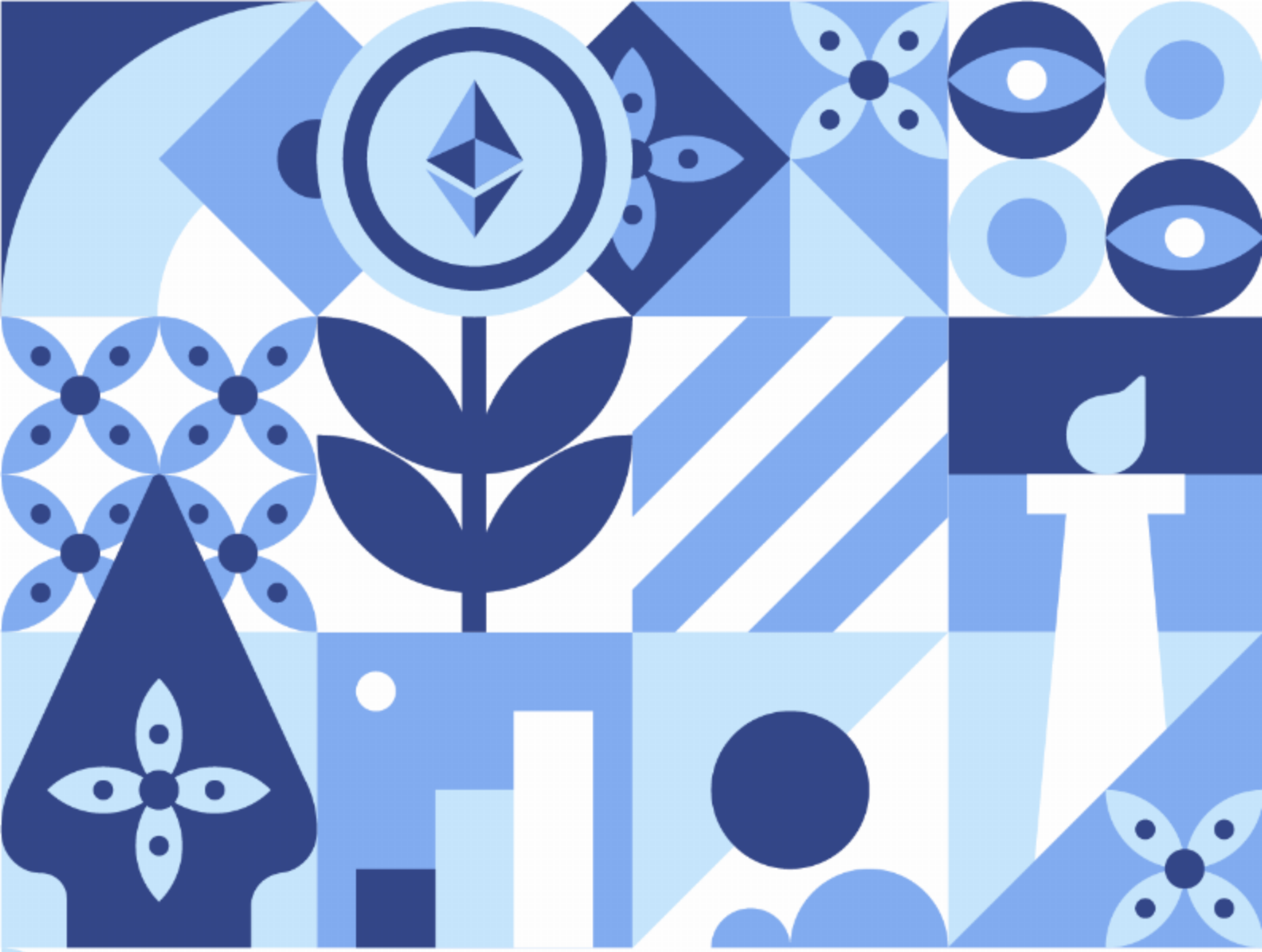

Function X

Smart Contract Audit Report

SYSFIXED

29 Dec 2018

TABLE OF CONTENTS

AUDITED DETAILS

Audited Project

Project name	Token ticker	Blockchain
Function X	FX	Ethereum

Addresses

Contract address	0x8c15ef5b4b21951d50e53e4fbda8298ffad25057
Contract deployer address	0x609b16e2952e32A580b2D77Dc2C53117d0De6185

Project Website

https://functionx.io/

Codebase

https://etherscan.io/address/0x8c15ef5b4b21951d50e53e4fbda8298ffad25057#code

SUMMARY

Function X is mirroring traditional financial products on the Function X network and creating decentralized financial products and a decentralized trading system. It is a highly customizable and expandable multi-chain architecture blockchain network (subnets) that can meet different business needs.

Contract Summary

Documentation Quality

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

- The technical description is provided clearly and structured and also dont have any high risk issue.

Code Quality

The Overall quality of the basecode is standard.

- Standard solidity basecode and rules are already followed by Function X 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 328, 352, 364, 398, 410, 94 and 362.
- SWC-103 | Pragma statements can be allowed to float when a contract is intended on lines 5.
- SWC-107 | It is recommended to use a reentrancy lock, reentrancy weaknesses detected on lines 411 and 405.
- 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 32, 411 and 405.
- SWC-111 | It is recommended to use alternatives to the deprecated constructions on lines 368.

CONCLUSION

We have audited the Function X project released on December 2018 to discover issues and identify potential security vulnerabilities in Function X 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 a satisfactory result with some low-risk issues.

The issues found in the Function X smart contract code 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 found are a floating pragma is set, a call to a user-supplied address is executed, a state variable visibility is not set, an assertion violation is triggered, the "constant" state mutability modifier is now deprecated, and a requirement was violated in a nested call. The call was reverted as a result. Make sure valid inputs are provided to the nested call (for instance, via passed arguments)

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.	PASS
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.	ISSUE FOUND
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.	ISSUE FOUND
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 griefing 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	Friday Dec 28 2018 09:12:01 GMT+0000 (Coordinated Universal Time)
Finished	Saturday Dec 29 2018 11:51:51 GMT+0000 (Coordinated Universal Time)
Mode	Standard
Main Source File	FunctionXToken.sol

Detected Issues

ID	Title	Severity	Status
SWC-100	FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)	low	acknowledged
SWC-100	FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)	low	acknowledged
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SWC-100	FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)	low	acknowledged
SWC-100	FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-107	A CALL TO A USER-SUPPLIED ADDRESS IS EXECUTED.	low	acknowledged
SWC-107	A CALL TO A USER-SUPPLIED ADDRESS IS EXECUTED.	low	acknowledged
SWC-108	STATE VARIABLE VISIBILITY IS NOT SET.	low	acknowledged
SWC-108	STATE VARIABLE VISIBILITY IS NOT SET.	low	acknowledged
SWC-110	AN ASSERTION VIOLATION WAS TRIGGERED.	low	acknowledged

SWC-111	USE OF THE "CONSTANT" STATE MUTABILITY MODIFIER IS DEPRECATED.	low	acknowledged
SWC-123	REQUIREMENT VIOLATION.	low	acknowledged
SWC-123	REQUIREMENT VIOLATION.	low	acknowledged

SWC-100 | FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)

LINE 328

low SEVERITY

The function definition of "tokenFallback" lacks a visibility specifier. Note that the compiler assumes "public" visibility by default. Function visibility should always be specified explicitly to assure correctness of the code and improve readability.

Source File

- FunctionXToken.sol

Locations

```
327
328   function tokenFallback(address sender, uint256 _value, bytes _extraData) returns
(bool) {}
329
330   }
331
332
```

SWC-100 | FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)

LINE 352

low SEVERITY

The function definition of "FunctionXToken" lacks a visibility specifier. Note that the compiler assumes "public" visibility by default. Function visibility should always be specified explicitly to assure correctness of the code and improve readability.

Source File

- FunctionXToken.sol

Locations

```
351
352   function FunctionXToken() {
353
354   }
355
356
```

SWC-100 | FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)

LINE 364

low SEVERITY

The function definition of "setStopReceive" lacks a visibility specifier. Note that the compiler assumes "public" visibility by default. Function visibility should always be specified explicitly to assure correctness of the code and improve readability.

Source File

- FunctionXToken.sol

Locations

```
363
364   function setStopReceive(bool stop) {
365   stopReceive[msg.sender] = stop;
366   }
367
368
```

SWC-100 | FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)

LINE 398

low SEVERITY

The function definition of "transferAndCall" lacks a visibility specifier. Note that the compiler assumes "public" visibility by default. Function visibility should always be specified explicitly to assure correctness of the code and improve readability.

Source File

- FunctionXToken.sol

Locations

```
397
398   function transferAndCall(address _recipient, uint256 _amount, bytes _data) {
399   require(_recipient != address(0));
400   require(_amount <= balances[msg.sender]);
401
402
```

SWC-100 | FUNCTION VISIBILITY IS NOT SET (PRIOR TO SOLIDITY 0.5.0)

LINE 410

low SEVERITY

The function definition of "transferERCToken" lacks a visibility specifier. Note that the compiler assumes "public" visibility by default. Function visibility should always be specified explicitly to assure correctness of the code and improve readability.

Source File

- FunctionXToken.sol

Locations

```
409
410   function transferERCToken(address _tokenContractAddress, address _to, uint256
_amount) onlyOwner {
411   require(ERC20(_tokenContractAddress).transfer(_to, _amount));
412   }
413
414
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 5

low SEVERITY

The current pragma Solidity directive is ""^0.4.11"". 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

- FunctionXToken.sol

Locations

```
4
5   pragma solidity ^0.4.11;
6
7
8   library SafeMath {
9
```

SWC-107 | A CALL TO A USER-SUPPLIED ADDRESS IS EXECUTED.

LINE 411

low SEVERITY

An external message call to an address specified by the caller is executed. Note that the callee account might contain arbitrary code and could re-enter any function within this contract. Reentering the contract in an intermediate state may lead to unexpected behaviour. Make sure that no state modifications are executed after this call and/or reentrancy guards are in place.

Source File

- FunctionXToken.sol

Locations

```
410   function transferERCToken(address _tokenContractAddress, address _to, uint256
_amount) onlyOwner {
411   require(ERC20(_tokenContractAddress).transfer(_to, _amount));
412   }
413
414   }
415
```

SWC-107 | A CALL TO A USER-SUPPLIED ADDRESS IS EXECUTED.

LINE 405

low SEVERITY

An external message call to an address specified by the caller is executed. Note that the callee account might contain arbitrary code and could re-enter any function within this contract. Reentering the contract in an intermediate state may lead to unexpected behaviour. Make sure that no state modifications are executed after this call and/or reentrancy guards are in place.

Source File

- FunctionXToken.sol

Locations

```
404
405   require(TokenRecipient(_recipient).tokenFallback(msg.sender, _amount, _data));
406   Transfer(msg.sender, _recipient, _amount);
407   }
408
409
```

SWC-108 | STATE VARIABLE VISIBILITY IS NOT SET.

LINE 94

low SEVERITY

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

Source File

- FunctionXToken.sol

Locations

```
93
94   mapping(address => uint256) balances;
95
96   /**
97   * @dev transfer token for a specified address
98
```

SWC-108 | STATE VARIABLE VISIBILITY IS NOT SET.

LINE 362

low SEVERITY

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

Source File

- FunctionXToken.sol

Locations

```
361
362   mapping (address => bool) stopReceive;
363
364   function setStopReceive(bool stop) {
365   stopReceive[msg.sender] = stop;
366
```

SWC-110 | AN ASSERTION VIOLATION WAS TRIGGERED.

LINE 32

low SEVERITY

It is possible to cause an assertion violation. Note that Solidity assert() statements should only be used to check invariants. Review the transaction trace generated for this issue and either make sure your program logic is correct, or use require() instead of assert() if your goal is to constrain user inputs or enforce preconditions. Remember to validate inputs from both callers (for instance, via passed arguments) and callees (for instance, via return values).

Source File

- FunctionXToken.sol

Locations

```
31   uint256 c = a + b;
32   assert(c >= a);
33   return c;
34   }
35   }
36
```

SWC-111 | USE OF THE "CONSTANT" STATE MUTABILITY MODIFIER IS DEPRECATED.

LINE 368

low SEVERITY

Using "constant" as a state mutability modifier in function "getStopReceive" is disallowed as of Solidity version 0.5.0. Use "view" instead.

Source File

- FunctionXToken.sol

Locations

```
367
368   function getStopReceive() constant public returns (bool) {
369   return stopReceive[msg.sender];
370   }
371
372
```

SWC-123 | REQUIREMENT VIOLATION.

LINE 411

low SEVERITY

A requirement was violated in a nested call and the call was reverted as a result. Make sure valid inputs are provided to the nested call (for instance, via passed arguments).

Source File

- FunctionXToken.sol

Locations

```
410   function transferERCToken(address _tokenContractAddress, address _to, uint256
_amount) onlyOwner {
411   require(ERC20(_tokenContractAddress).transfer(_to, _amount));
412   }
413
414   }
415
```

SWC-123 | REQUIREMENT VIOLATION.

LINE 405

low SEVERITY

A requirement was violated in a nested call and the call was reverted as a result. Make sure valid inputs are provided to the nested call (for instance, via passed arguments).

Source File

- FunctionXToken.sol

Locations

```
404
405   require(TokenRecipient(_recipient).tokenFallback(msg.sender, _amount, _data));
406   Transfer(msg.sender, _recipient, _amount);
407   }
408
409
```

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