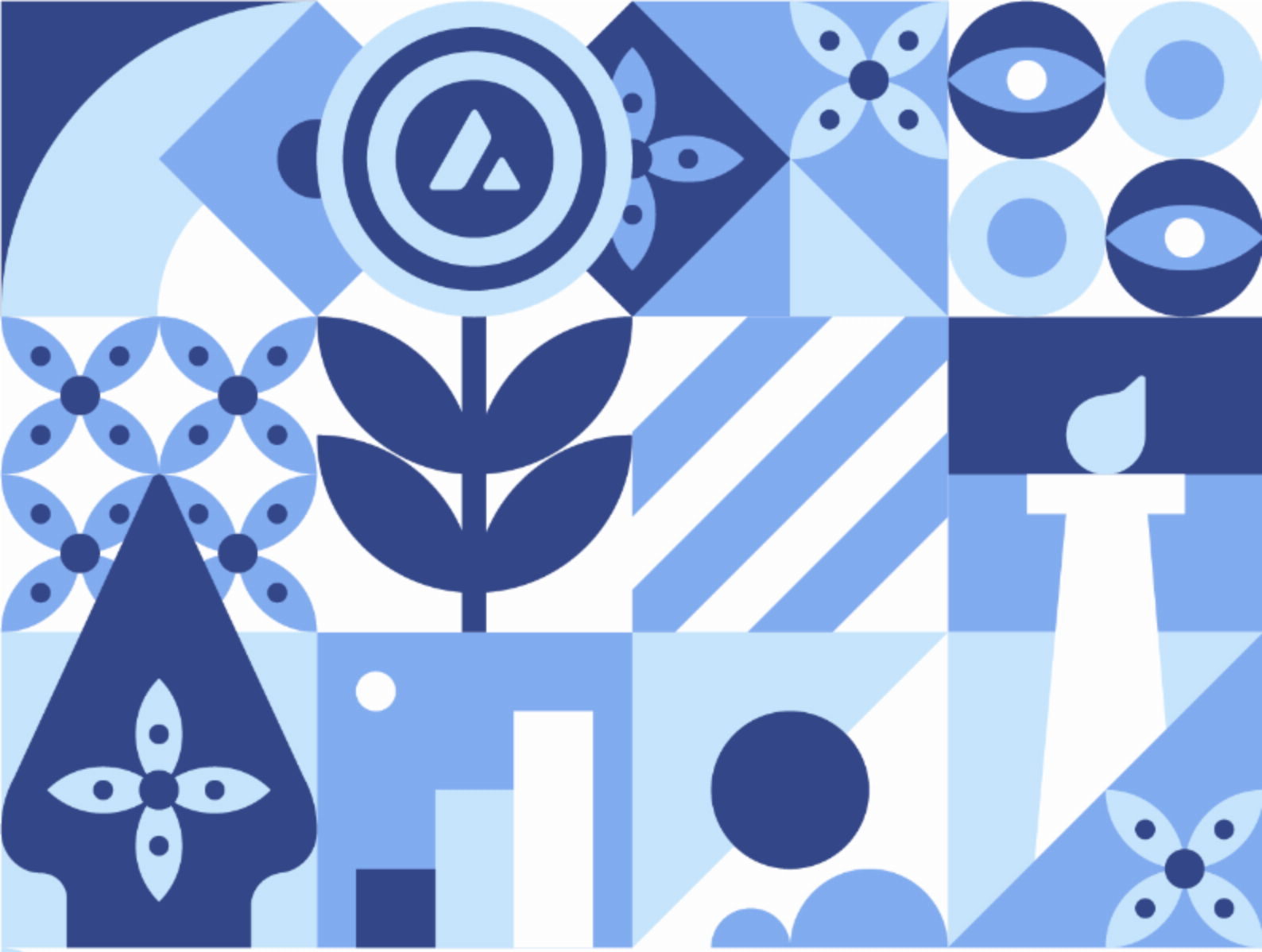

0x

Smart Contract Audit Report

SYSFIXED

24 Jul 2021

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AUDITED DETAILS

Audited Project

Project name	Token ticker	Blockchain
0x	ZRX.e	Avalanche

Addresses

Contract address	0x596fa47043f99a4e0f122243b841e55375cde0d2
Contract deployer address	0x50Ff3B278fCC70ec7A9465063d68029AB460eA04

Project Website

https://www.0x.org/

Codebase

https://snowtrace.io/address/0x596fa47043f99a4e0f122243b841e55375cde0d2#code

SUMMARY

0x is an essential infrastructure for the emerging crypto economy and enables markets to be created that couldn't have existed. As more assets become tokenized, public blockchains allow establishing of a new financial stack that is more efficient, transparent, and equitable than any previous system.

Contract Summary

Documentation Quality

0x 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 0x 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 541.
- SWC-103 | Pragma statements can be allowed to float when a contract is intended on lines 9, 88, 115, 141, 445, 485 and 524.
- SWC-107 | It is recommended to use a reentrancy lock, reentrancy weaknesses detected on lines 376 and 377.
- SWC-115 | tx.origin should not be used for authorization, use msg.sender instead on lines 622, 622, 349, 419, 517, 393 and 420.

CONCLUSION

We have audited the 0x project released in July 2021 to discover issues and identify potential security vulnerabilities in 0x 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 issues found in the 0x 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 some arithmetic operation issues, a floating pragma is set, read of persistent state following the external call, state variable visibility is not set, and Use of "tx.origin" as a part of authorization control. The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to act on their behalf. It is recommended to use msg.sender instead. Also, 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.

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.	PASS
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.	ISSUE FOUND
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 Jul 23 2021 04:36:44 GMT+0000 (Coordinated Universal Time)
Finished	Saturday Jul 24 2021 03:02:39 GMT+0000 (Coordinated Universal Time)
Mode	Standard
Main Source File	BridgeToken.sol

Detected Issues

ID	Title	Severity	Status
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-103	A FLOATING PRAGMA IS SET.	low	acknowledged
SWC-107	READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.	low	acknowledged
SWC-107	READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.	low	acknowledged
SWC-108	STATE VARIABLE VISIBILITY IS NOT SET.	low	acknowledged
SWC-115	USE OF "TX.ORIGIN" AS A PART OF AUTHORIZATION CONTROL.	low	acknowledged
SWC-115	USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.	low	acknowledged
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SWC-103 | A FLOATING PRAGMA IS SET.

LINE 9

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

- BridgeToken.sol

Locations

```
8
9   pragma solidity ^0.8.0;
10
11   /**
12   * @dev Interface of the ERC20 standard as defined in the EIP.
13
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 88

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

- BridgeToken.sol

Locations

```
87
88   pragma solidity ^0.8.0;
89
90
91   /**
92
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 115

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

- BridgeToken.sol

Locations

```
114
115   pragma solidity ^0.8.0;
116
117   /*
118   * @dev Provides information about the current execution context, including the
119
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 141

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

- BridgeToken.sol

Locations

```
140
141   pragma solidity ^0.8.0;
142
143
144
145
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 445

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

- BridgeToken.sol

Locations

```
444
445   pragma solidity ^0.8.0;
446
447
448
449
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 485

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

- BridgeToken.sol

Locations

```
484
485   pragma solidity ^0.8.0;
486
487   library Roles {
488   struct Role {
489
```

SWC-103 | A FLOATING PRAGMA IS SET.

LINE 524

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

- BridgeToken.sol

Locations

```
523
524   pragma solidity ^0.8.0;
525
526
527
528
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 376

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- BridgeToken.sol

Locations

```
375
376   _totalSupply += amount;
377   _balances[account] += amount;
378   emit Transfer(address(0), account, amount);
379   }
380
```

SWC-107 | READ OF PERSISTENT STATE FOLLOWING EXTERNAL CALL.

LINE 377

low SEVERITY

The contract account state is accessed after an external call. To prevent reentrancy issues, consider accessing the state only before the call, especially if the callee is untrusted. Alternatively, a reentrancy lock can be used to prevent untrusted callees from re-entering the contract in an intermediate state.

Source File

- BridgeToken.sol

Locations

```
376   _totalSupply += amount;
377   _balances[account] += amount;
378   emit Transfer(address(0), account, amount);
379   }
380
381
```

SWC-108 | STATE VARIABLE VISIBILITY IS NOT SET.

LINE 541

low SEVERITY

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

Source File

- BridgeToken.sol

Locations

```
540   }
541   mapping(address => SwapToken) swapTokens;
542
543   mapping(uint256 => bool) public chainIds;
544
545
```

SWC-115 | USE OF "TX.ORIGIN" AS A PART OF AUTHORIZATION CONTROL.

LINE 622

low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using "tx.origin" as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use "msg.sender" instead.

Source File

- BridgeToken.sol

Locations

```
621   function unwrap(uint256 amount, uint256 chainId) public {
622   require(tx.origin == msg.sender, "Contract calls not supported.");
623   require(chainIds[chainId] == true, "Chain ID not supported.");
624   _burn(msg.sender, amount);
625   emit Unwrap(amount, chainId);
626
```

SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 622

low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

Source File

- BridgeToken.sol

Locations

```
621   function unwrap(uint256 amount, uint256 chainId) public {
622   require(tx.origin == msg.sender, "Contract calls not supported.");
623   require(chainIds[chainId] == true, "Chain ID not supported.");
624   _burn(msg.sender, amount);
625   emit Unwrap(amount, chainId);
626
```

SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 349

low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

Source File

- BridgeToken.sol

Locations

```
348   function _transfer(address sender, address recipient, uint256 amount) internal
virtual {
349   require(sender != address(0), "ERC20: transfer from the zero address");
350   require(recipient != address(0), "ERC20: transfer to the zero address");
351
352   _beforeTokenTransfer(sender, recipient, amount);
353
```

SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 419

low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

Source File

- BridgeToken.sol

Locations

```
418   function _approve(address owner, address spender, uint256 amount) internal virtual
{
419   require(owner != address(0), "ERC20: approve from the zero address");
420   require(spender != address(0), "ERC20: approve to the zero address");
421
422   _allowances[owner][spender] = amount;
423
```

SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 517

low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

Source File

- BridgeToken.sol

Locations

```
516   {
517   require(account != address(0), "Roles: account is the zero address");
518   return role.bearer[account];
519   }
520   }
521
```

SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 393

low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

Source File

- BridgeToken.sol

Locations

```
392   function _burn(address account, uint256 amount) internal virtual {
393   require(account != address(0), "ERC20: burn from the zero address");
394
395   _beforeTokenTransfer(account, address(0), amount);
396
397
```

SWC-115 | USE OF TX.ORIGIN AS A PART OF AUTHORIZATION CONTROL.

LINE 420

low SEVERITY

The tx.origin environment variable has been found to influence a control flow decision. Note that using tx.origin as a security control might cause a situation where a user inadvertently authorizes a smart contract to perform an action on their behalf. It is recommended to use msg.sender instead.

Source File

- BridgeToken.sol

Locations

```
419   require(owner != address(0), "ERC20: approve from the zero address");
420   require(spender != address(0), "ERC20: approve to the zero address");
421
422   _allowances[owner][spender] = amount;
423   emit Approval(owner, spender, amount);
424
```

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This is a limited report on our findings based on our analysis, in accordance with good industry practice as of the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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