Cyberscope

Audit Report
Ankaa Exchange

March 2023

SHA256	a85132b4528286e3dde2afee1299e35216b43483265599699d1dccd93e394066
Audited by	© cyberscope

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Review

Contract Name	AnkaaToken
Testing Deploy	https://testnet.bscscan.com/address/0x0e2ea7a5176534e642afc03457ff4ea5789f363c
Symbol	ANKAA
Decimals	18

Audit Updates

Initial Audit	15 Mar 2023

Source Files

Filename	SHA256
contracts/AnkaaToken.sol	a85132b4528286e3dde2afee1299e35216b43483265599699d1dccd93e394066

Analysis

🔴 Critical 🟠 Medium ⚪ Minor / Informative 🔵 Pass

Severity	Code	Description	Status
⚪	ST	Stops Transactions	Unresolved
🔵	OCTD	Transfers Contract's Tokens	Passed
🔵	OTUT	Transfers User's Tokens	Passed
🔵	ELFM	Exceeds Fees Limit	Passed
🔵	ULTW	Transfers Liquidity to Team Wallet	Passed
🔴	MT	Mints Tokens	Unresolved
🔵	BT	Burns Tokens	Passed
🔵	BC	Blacklists Addresses	Passed

ST - Stops Transactions

Criticality	Minor / Informative
Location	contracts/AnkaaToken.sol#L1500
Status	Unresolved

Description

The contract owner has the authority to stop transactions for all users. The owner may take advantage of it by calling the `pause` function.

```
function _beforeTokenTransfer(address from, address to, uint256 amount)
    internal
    whenNotPaused
    override
{
    super._beforeTokenTransfer(from, to, amount);
}
```

Recommendation

The team should carefully manage the private keys of the owner's account. We strongly recommend a powerful security mechanism that will prevent a single user from accessing the contract admin functions. Some suggestions are:

- Introduce a time-locker mechanism with a reasonable delay.
- Introduce a multi-sign wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.
- Renouncing the ownership will eliminate the threats but it is non-reversible.

MT - Mints Tokens

Criticality	Critical
Location	contracts/AnkaaToken.sol#L1495
Status	Unresolved

Description

The contract owner has the authority to mint tokens. The owner may take advantage of it by calling the `mint` function. As a result, the contract tokens will be highly inflated.

```
function mint(address to, uint256 amount) public onlyRole(MINTER_ROLE) {
    require(totalSupply() + amount <= _maxSupply, "Token cap reached, cannot mint
more.");
    _mint(to, amount);
}
```

Recommendation

The team should carefully manage the private keys of the owner's account. We strongly recommend a powerful security mechanism that will prevent a single user from accessing the contract admin functions. Some suggestions are:

- Introduce a time-locker mechanism with a reasonable delay.
- Introduce a multi-sign wallet so that many addresses will confirm the action.
- Introduce a governance model where users will vote about the actions.
- Renouncing the ownership will eliminate the threats but it is non-reversible.

Diagnostics

● Critical ● Medium ● Minor / Informative

Severity	Code	Description	Status
●	L09	Dead Code Elimination	Unresolved
●	L13	Divide before Multiply Operation	Unresolved
●	L17	Usage of Solidity Assembly	Unresolved
●	L18	Multiple Pragma Directives	Unresolved
●	L19	Stable Compiler Version	Unresolved

L09 - Dead Code Elimination

Criticality	Minor / Informative
Location	contracts/AnkaaToken.sol#L80,87,95,106,116,201,219,255,266,308,319,357,370,400,426,451,803,812,1354
Status	Unresolved

Description

In Solidity, dead code is code that is written in the contract but is never executed or reached during normal contract execution. Dead code can occur for a variety of reasons, such as:

- Conditional statements that are always false.
- Functions that are never called.
- Unreachable code (e.g., code that follows a return statement).

Dead code can make a contract more difficult to understand and maintain, and can also increase the size of the contract and the cost of deploying and interacting with it.

```
function max(uint256 a, uint256 b) internal pure returns (uint256) {
        return a > b ? a : b;
    }

function min(uint256 a, uint256 b) internal pure returns (uint256) {
        return a < b ? a : b;
...
        return (a & b) + (a ^ b) / 2;
    }

function ceilDiv(uint256 a, uint256 b) internal pure returns (uint256) {
        // (a + b - 1) / b can overflow on addition, so we distribute.
        return a == 0 ? 0 : (a - 1) / b + 1;
    }

...
```

Recommendation

To avoid creating dead code, it's important to carefully consider the logic and flow of the contract and to remove any code that is not needed or that is never executed. This can help improve the clarity and efficiency of the contract.

L13 - Divide before Multiply Operation

Criticality	Minor / Informative
Location	contracts/AnkaaToken.sol#L163,166,178,182,183,184,185,186,187,193
Status	Unresolved

Description

It is important to be aware of the order of operations when performing arithmetic calculations. This is especially important when working with large numbers, as the order of operations can affect the final result of the calculation. Performing divisions before multiplications may cause a loss of prediction.

```
denominator := div(denominator, twos)
inverse *= 2 - denominator * inverse
```

Recommendation

To avoid this issue, it is recommended to carefully consider the order of operations when performing arithmetic calculations in Solidity. It's generally a good idea to use parentheses to specify the order of operations. The basic rule is that the multiplications should be prior to the divisions.

L17 - Usage of Solidity Assembly

Criticality	Minor / Informative
Location	contracts/AnkaaToken.sol#L127,432
Status	Unresolved

Description

Using assembly can be useful for optimizing code, but it can also be error-prone. It's important to carefully test and debug assembly code to ensure that it is correct and does not contain any errors.

Some common types of errors that can occur when using assembly in Solidity include Syntax, Type, Out-of-bounds, Stack, and Revert.

```
assembly {
                let mm := mulmod(x, y, not(0))
                prod0 := mul(x, y)
                prod1 := sub(sub(mm, prod0), lt(mm, prod0))
            }

assembly {
                ptr := add(buffer, add(32, length))
            }
```

Recommendation

It is recommended to use assembly sparingly and only when necessary, as it can be difficult to read and understand compared to Solidity code.

L18 - Multiple Pragma Directives

Criticality	Minor / Informative
Location	contracts/AnkaaToken.sol#L6,34,65,413,485,576,603,852,959,1044,1074,1463
Status	Unresolved

Description

If the contract includes multiple conflicting pragma directives, it may produce unexpected errors. To avoid this, it's important to include the correct pragma directive at the top of the contract and to ensure that it is the only pragma directive included in the contract.

```
pragma solidity ^0.8.0;
pragma solidity ^0.8.0;


pragma solidity ^0.8.9;
```

Recommendation

It is important to include only one pragma directive at the top of the contract and to ensure that it accurately reflects the version of Solidity that the contract is written in.

By including all required compiler options and flags in a single pragma directive, the potential conflicts could be avoided and ensure that the contract can be compiled correctly.

L19 - Stable Compiler Version

Criticality	Minor / Informative
Location	contracts/AnkaaToken.sol#L6,34,65,413,485,576,603,852,959,1044,1074,1463
Status	Unresolved

Description

The `^` symbol indicates that any version of Solidity that is compatible with the specified version (i.e., any version that is a higher minor or patch version) can be used to compile the contract. The version lock is a mechanism that allows the author to specify a minimum version of the Solidity compiler that must be used to compile the contract code. This is useful because it ensures that the contract will be compiled using a version of the compiler that is known to be compatible with the code.

```
pragma solidity ^0.8.0;

pragma solidity ^0.8.0;



pragma solidity ^0.8.9;
```

Recommendation

The team is advised to lock the pragma to ensure the stability of the codebase. The locked pragma version ensures that the contract will not be deployed with an unexpected version. An unexpected version may produce vulnerabilities and undiscovered bugs. The compiler should be configured to the lowest version that provides all the required functionality for the codebase. As a result, the project will be compiled in a well-tested LTS (Long Term Support) environment.

Functions Analysis

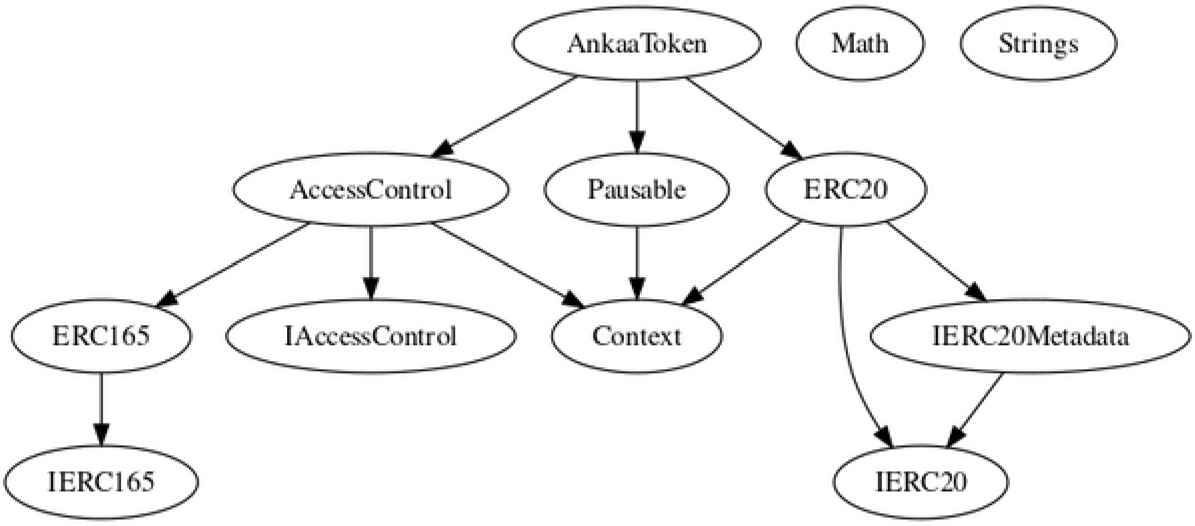
Contract	Type	Bases		
	Function Name	**Visibility**	**Mutability**	**Modifiers**
IERC165	Interface			
	supportsInterface	External		-
ERC165	Implementation	IERC165		
	supportsInterface	Public		-
Math	Library			
	max	Internal		
	min	Internal		
	average	Internal		
	ceilDiv	Internal		
	mulDiv	Internal		
	mulDiv	Internal		
	sqrt	Internal		
	sqrt	Internal		
	log2	Internal		
	log2	Internal		
	log10	Internal		
	log10	Internal		
	log256	Internal		
	log256	Internal		
Strings	Library			
	toString	Internal		

	toHexString	Internal		
	toHexString	Internal		
	toHexString	Internal		
IAccessControl	Interface			
	hasRole	External		-
	getRoleAdmin	External		-
	grantRole	External	✓	-
	revokeRole	External	✓	-
	renounceRole	External	✓	-
Context	Implementation			
	_msgSender	Internal		
	_msgData	Internal		
AccessControl	Implementation	Context, IAccessControl, ERC165		
	supportsInterface	Public		-
	hasRole	Public		-
	_checkRole	Internal		
	_checkRole	Internal		
	getRoleAdmin	Public		-
	grantRole	Public	✓	onlyRole
	revokeRole	Public	✓	onlyRole
	renounceRole	Public	✓	-
	_setupRole	Internal	✓	
	_setRoleAdmin	Internal	✓	
	_grantRole	Internal	✓	
	_revokeRole	Internal	✓	

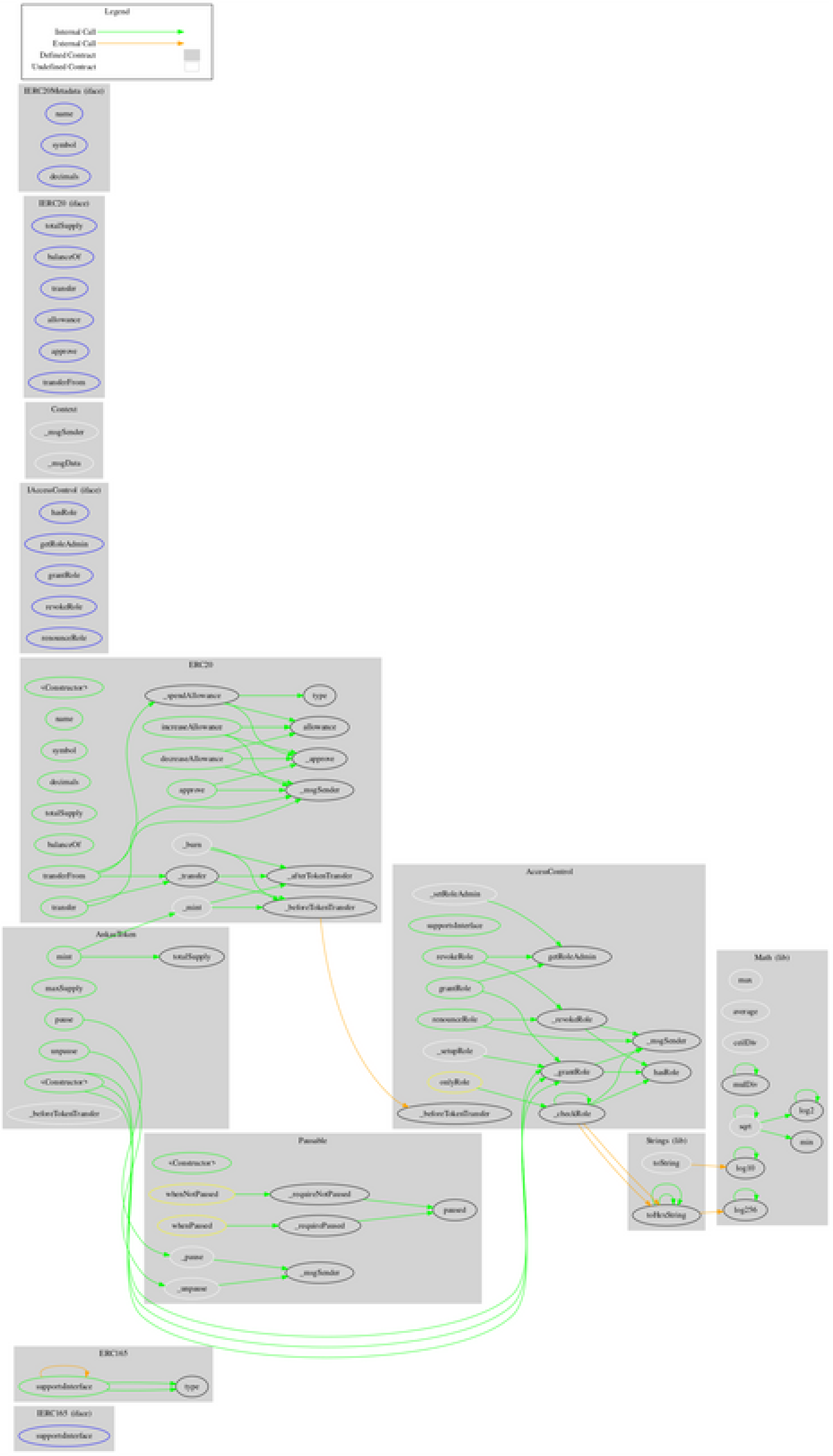
Pausable	Implementation	Context		
		Public	✓	-
	paused	Public		-
	_requireNotPaused	Internal		
	_requirePaused	Internal		
	_pause	Internal	✓	whenNotPaused
	_unpause	Internal	✓	whenPaused
IERC20	Interface			
	totalSupply	External		-
	balanceOf	External		-
	transfer	External	✓	-
	allowance	External		-
	approve	External	✓	-
	transferFrom	External	✓	-
IERC20Metadata	Interface	IERC20		
	name	External		-
	symbol	External		-
	decimals	External		-
ERC20	Implementation	Context, IERC20, IERC20Metadata		
		Public	✓	-
	name	Public		-
	symbol	Public		-
	decimals	Public		-

	totalSupply	Public		-
	balanceOf	Public		-
	transfer	Public	✓	-
	allowance	Public		-
	approve	Public	✓	-
	transferFrom	Public	✓	-
	increaseAllowance	Public	✓	-
	decreaseAllowance	Public	✓	-
	_transfer	Internal	✓	
	_mint	Internal	✓	
	_burn	Internal	✓	
	_approve	Internal	✓	
	_spendAllowance	Internal	✓	
	_beforeTokenTransfer	Internal	✓	
	_afterTokenTransfer	Internal	✓	
AnkaaToken	Implementation	ERC20, Pausable, AccessControl		
		Public	✓	ERC20
	maxSupply	Public		-
	pause	Public	✓	onlyRole
	unpause	Public	✓	onlyRole
	mint	Public	✓	onlyRole
	_beforeTokenTransfer	Internal	✓	whenNotPaused

Inheritance Graph



Flow Graph


Legend
Internal Call
External Call
Defined Contract
Undefined Contract
IERC20Metadata (iface)
name
symbol
decimals
IERC20 (iface)
totalSupply
balanceOf
transfer
allowance
approve
transferFrom
Context
_msgSender
_msgData
IAccessControl (iface)
hasRole
getRoleAdmin
grantRole
revokeRole
renounceRole
ERC20
<Constructor>
name
symbol
decimals
totalSupply
balanceOf
transferFrom
transfer
_spendAllowance
increaseAllowance
decreaseAllowance
approve
_burn
_transfer
_mint
type
allowance
_approve
_msgSender
_afterTokenTransfer
_beforeTokenTransfer
AnkaaToken
mint
totalSupply
maxSupply
pause
unpause
<Constructor>
_beforeTokenTransfer
AccessControl
_setRoleAdmin
supportsInterface
revokeRole
grantRole
renounceRole
_setupRole
onlyRole
_beforeTokenTransfer
getRoleAdmin
_revokeRole
_msgSender
_grantRole
hasRole
_checkRole
Math (lib)
max
average
ceilDiv
mulDiv
sqrt
log2
min
log10
log256
Strings (lib)
toString
toHexString
Pausable
<Constructor>
whenNotPaused
whenPaused
_requireNotPaused
_requirePaused
paused
_pause
_unpause
_msgSender
ERC165
supportsInterface
type
IERC165 (iface)
supportsInterface

Summary

Ankaa Exchange contract implements a token mechanism. This audit investigates security issues, business logic concerns, and potential improvements. There are some functions that can be abused by the owner like stopping transactions and mint tokens. if the contract owner abuses the mint functionality, then the contract will be highly inflated. A multi-wallet signing pattern will provide security against potential hacks. Temporarily locking the contract or renouncing ownership will eliminate all the contract threats.

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The Cyberscope team

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